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# Radio Control **CAR ACTION**

THE WORLD'S LEADING R/C CAR MAGAZINE

July 1999

**"JUG"MENT  
DAY IS  
HERE!**

**8 PAGE  
THRASH  
TEST**

**TAMIYA**

**JUGGERNAUT**

**TRAXXAS NITRO  
4 TEC PRO**

**NEO ATTACK MX4**

**KYOSHO LANDMAX  
SUPERFLO FORD  
F-150**

**TC3** **THE REAL  
DEAL** pg. 120

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07>



## features



60

### 144 13th Annual Cactus Classic Kinwald's revenge

BY GEORGE M. GONZALEZ

### 162 HOW TO Dye plastic parts

Parts to "dye" for

BY NEP MELENDRES



96

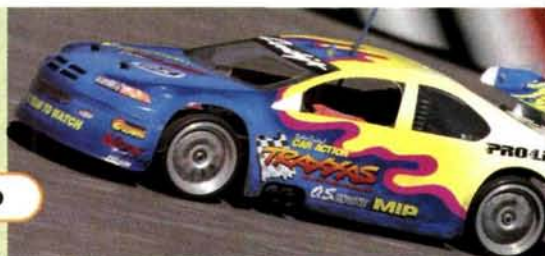
## thrash tests

### 60 Tamiya Juggernaut

Clod killer  
BY STEVE POND

### 70 Traxxas Nitro 4 Tec Pro

"The team to watch" is back  
BY GEORGE M. GONZALEZ



### 78 Kyosho Super Eight Landmax Superflo Ford F-150

Flying tiger  
BY DOUG MERTES



### 86 NEO Attack MX4

Road warrior  
BY GREG VOGEL



144

## departments

10 Starting Line

18 Readers Write

32 Readers' Rides

133 Racer News

• NEWS FLASHES!

• RACER TIP OF THE MONTH

—provided by Regan LeBlanc, mechanic  
to Team Orion/Associated driver  
Richard Saxton

• RACER PROFILE

—Billy Easton

• SPEED SHOP

—"The Admiral" clutch from Cross

—Golden Horizons Turbo Head

—CEN 2-speed tranny

—HPI Super Nitro RS4 hop-ups

—Traxxas nitro cleaner

182 Product Watch

• GM Racing Pinnacle stock motors

• Hammad Ghuman VLT shocks

• Deans Speed Jig

• A-Main Racing Products RC10GT

Racing Chassis

• Keyence A-01 Professional ESC

207 Track Directory

216 Classified Ads

217 Manufacturer and advertiser  
contact information

## columns

25 Inside Scoop

BY CHRIS CHIANELLI

38 Pit Tips

BY JIM NEWMAN

46 Troubleshooting

BY DOUG MERTES

52 R/C Doctor

BY DOUG MERTES

56 Concours Corner

BY KEVIN MEYER

215 Chris's Back Lot

BY CHRIS CHIANELLI

ON THE COVER (from top): Trinity's  
3000mAh Panasonic super-cell;  
Tamiya's class-leading Juggernaut,  
comin' at ya.



## They're here!

Silly question: what are the most anticipated R/C vehicles of 1999? All together now: Tamiya Juggernaut and Associated TC3. This month, we're proud to bring you both! The R/C world first glimpsed the hot-as-a-pistol



TC3 in our January issue's "New for '99" section, but now we have the production car in front of the cameras for our exclusive **First Look: Associated TC3**.

We scored even bigger with the Juggernaut; senior editor Steve Pond has given the new monster machine a complete thrashing, so monster-truck fans, you're in for a treat—our incredibly comprehensive **Tamiya Juggernaut Thrash Test** is the ultimate guide to this truly awesome machine.

You'll need to charge some packs for both those hot new electrics, and this month, there's a guide to the chargers that are just as trick as the vehicles mentioned above. The **Super Charger Guide** covers the exotic high-end juice boxes racers savor; these digital do-alls can charge,



cycle, analyze and more. There's a lot to know before you invest in a charger of this caliber, but we'll give you all the info you need.

I saved the biggest news for last. Trinity has given us the exclusive scoop on the newest battery technology: nickel-metal-hydride cells to power your car—not just your radio. And here's the kicker: they're 3000mAh! Three thousand. Amazing! Busy guy Steve Pond explains how the **3000mAh NiMH cells** work, divulges detailed test data and explores the possible ramifications of the cells that are sure to shake up the industry.



See ya next month!

*Peter Vieira*

Peter Vieira  
Editor

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## Would we Lie to you?

I read Greg's "Project Jump Truck" segment in the March issue's truck guide, and I give it two big thumbs up! But I have one question: did your truck really make that 10-foot jump, or is it hanging by a wire from that light pole? I have a Traxxas Stampede, too, and I can only get about 6 feet of air. What's the deal?

PAUL O'MEALY  
Angola, IN



Paul, you're not the only one who doubted the abilities of Project Jump Truck. Think about this, readers: a 2WD truck with large-diameter tires, 10 matched Orion cells wired in series and dumping all their power into an Orion 14x2 motor geared with a 19-tooth pinion and with a 56-tooth/32-pitch spur, flying down a 200-foot-long BMX track's starting hill at 50mph (yes, 50mph; we clocked it), and hitting a jump with a face angle of 30 to 35 degrees. One word comes to my mind: "Launch!" If anything, 10 feet seems rather low. So to answer everyone's questions: yes, it really jumped that high—and higher. No, we didn't dangle the truck from a wire. No, we didn't throw the truck in the air. No, we didn't shoot it out of a cannon. No, the alien spaceship from "South Park" didn't levitate it with a tractor beam. And no, you can't have the truck; sorry. I've included another photo just to show you how insane we really

got. I hope this inspires you to build your own project trucks, and I hope to see photos of your creations. Send your pictures to *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

—Greg

## Yes, Adam, there are Tracks in Indiana

The purpose of this letter is to help me find some place to race my radio-control cars in my area. Would you also send me a poster of that big blue Dodge Ram with the white stripes? So would you send me some information please. Thank you for your time and consideration.

ADAM SCHOTZMAN  
Howe, IN

Adam, I run a letter like yours every once in a while, just to remind all our readers that we publish the Pro-Line Track Directory in every other issue (and yes, this is a Directory issue). The Directory lists all the tracks in all 50 states, plus international listings. At last count, there were 17 tracks in Indiana, so there's gotta be one near you. As for your free poster: we don't do free posters.

—Pete

## Hit by the Big One

I am building a track, and the jumps seem to get all cracked, like an earthquake hit them. I was wondering if you could tell me why that is, and how I could prevent it. I have another question: where can I buy the Trinity hinge-pin brace that you had on the Stampede in the March issue? I did not see it in Tower Hobbies. [email]

JOEL MURAWSKI

Your track isn't actually getting hit by earthquakes, is it? Just checking. It sounds as though the cracks are forming when the dirt dries out—kind of like the cracks you might see in a dry lakebed. Water your track frequently to prevent the cracking and keep dust down. The Trinity hinge-pin brace should be available from Tower, even if it's not listed in the

ad. Call the number for order assistance; a customer-service person will track it down. Do yourself and the folks at Tower a favor, though: have the part number handy! Don't forget your local hobby shop, either; the part could be on a shelf just waiting for you. Call them first.

—Greg

## Inferno Fan

Does Kyosho still offer the "Inferno" series buggies? I ask because I used to have a Tamiya Striker when they first came out (I was about 12, now I'm 25), and I am thinking about getting back into the sport. I'm interested in both 1/10- and 1/8-scale 4WD nitro gas buggies. I know the performance of the 1/8 scale but have no info on 1/10-scale 4WD buggies. Any advice or info?

Thank you for a very informative and interesting magazine. I have compared it with the others, and *R/C Car Action* is the clear winner. [email]  
JASON WAMPLER

Thanks for the kind words, Jason. The Inferno is still kickin' as the Inferno DX; it's a great first 1/8-scale buggy with tons of upgrade potential. If you have the skills, you can win club races all summer long with it, straight from the box. The top-end K-buggies are now based on the "MP" platform, which includes the MP-5, the new MP-6 and the super-trick MP-6 International. We reviewed the MP-5 in our December '98 "1/8-scale 4WD Nitro Buggy Guide," and we "Thrash Test"-ed the International in the May '99 issue. There aren't many 1/10 4WD nitro offerings these days; OFNA's Pirate 10 and Pirate 10 Evolution are the only ones readily available. However, I think you'll actually have an easier time getting started with an 1/8-scale buggy like the Inferno DX, and you can be certain there will be a race class for you if you get bitten by the competition bug. Welcome back to R/C!

—Pete

**WRITE TO US!** We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

### EMAIL ADDRESSES:

Chris Chianelli: chrisc@airage.com  
George Gonzalez: georgeg@airage.com  
Steve Pond: stevep@airage.com  
Peter Vieira: peterv@airage.com  
Greg Vogel: gregv@airage.com

## Back and Forth

I am having trouble with my T3; I hope you can help. I use a GM V-12R, an Airtronics M8 and a Trinity 13x3 mod. I am 100 percent sure that the electrics are wired right but for some reason, the truck goes into reverse when I hit the throttle. I thought it was my speedo so I sent it to GM, but they said it was fine. I can't figure it out, and I am fed up with it. Can you help? [email]

GARY FOSTER

Been there, Gary. First, check to be sure that you have followed the ESC setup instructions precisely. If you're "telling" the ESC that forward trigger is to be used for reverse, that's what it will do. If you have, indeed, performed the setup steps correctly, your next stop should be the motor. Even if the positive wire is on the "+" lug, and the negative wire is on the "-" lug, the motor will still run backwards if the endbell has been reversed. Fire up your truck and watch the ESC's indicator light as you squeeze full-forward throttle at the radio (don't worry about which way the truck's wheels are actually turning); note if it's red or green, steady or flashing, then check the manual to see what it should be doing at full-forward throttle. If it's doing what the manual says it should but the motor is running backwards, then you can be sure your motor's endbell is reversed. Rotate it 180°, and you'll be back in business.

—Pete





BY CHRIS CHIANELLI



## COMPAGNUCCI TEAMS UP WITH MRC



I've been anxiously awaiting the arrival of Compagnucci's (say "Com-pa-new-chee") innovative gas—real gas; not nitro—cars here in the States, and now MRC has made my wish come true by sealing a distribution deal with the innovative Italian company. In case you missed it in "New For '99" (January 1999), the 'Nooch is 1/8 scale and 4WD and includes a .40 gasoline/spark-ignition engine that can move the car along at 50mph. All kinds of rally, sports car and off-road bodies are available.

Altech Marketing, P.O. Box 7182, Edison, NJ 08818;  
(732) 225-6144; fax (732) 225-0091.



## Dual Pro stops runaways

The best way to wreck your 1/8- or 1/4-scale car is if, unbeknownst to you, your receiver battery pack suddenly goes south. You're powerless as you simply watch your much-loved (and expensive) big-scale racer lock itself in full-on throttle as it searches out something immobile—like a concrete curb—on which to self-destruct. Don't let it happen to you! The Dual Pro monitors the battery and protects your car from damage due to dumped or disconnected receiver batteries by indicating voltage with LEDs; a green light means you've got 4.5 volts or more powering the radio gear, while a red light lets you know you're below the 4.5V mark, and you should recharge. If the unit senses less than 4.3 volts heading to the radio gear, it will shut down the engine. It's that simple. The Dual Pro works with any spark-ignition engine (sorry, glow guys).

JRR Multimedia Enterprises Inc.; email: dualpro@home.com.

That's right; Team Trinity has entered the nitro-racing world and has

## MONSTER HORSEPOWER FUEL

added glow fuel to its extensive line of performance products. Of course, Monster Horsepower will be available with various percentages of nitromethane, but rumor has it—and here's the big news—Trinity will print the percentage of lubricant by volume, not weight on the bottle's label. Those guys at Trinity; they really know how to do the right thing.

Trinity Products Inc., 36  
Meridan Rd., Edison, NJ  
08820; (732) 635-1600;  
fax (732) 635-1640.





## Schumacher gets sporty

If you're looking for a high-performance touring car at a budget price, you should definitely check out Schumacher's new SST Sport. The car will include molded shocks, metal and plastic bushings and fixed camber links. Naturally, it will be fully upgradable to SST '99 Pro specs, but even in stock trim, it should have no trouble running with the big boys as long as you keep those bushings clean and well lubed. Kits will be offered with a choice of the Volvo body shown or Schumacher's attractive Accord shell.

Schumacher USA, 6302 Benjamin Rd., Ste. 404, Tampa, FL 33634; (813) 889-9691; fax (813) 889-9593; website: [www.racing-cars.com](http://www.racing-cars.com).



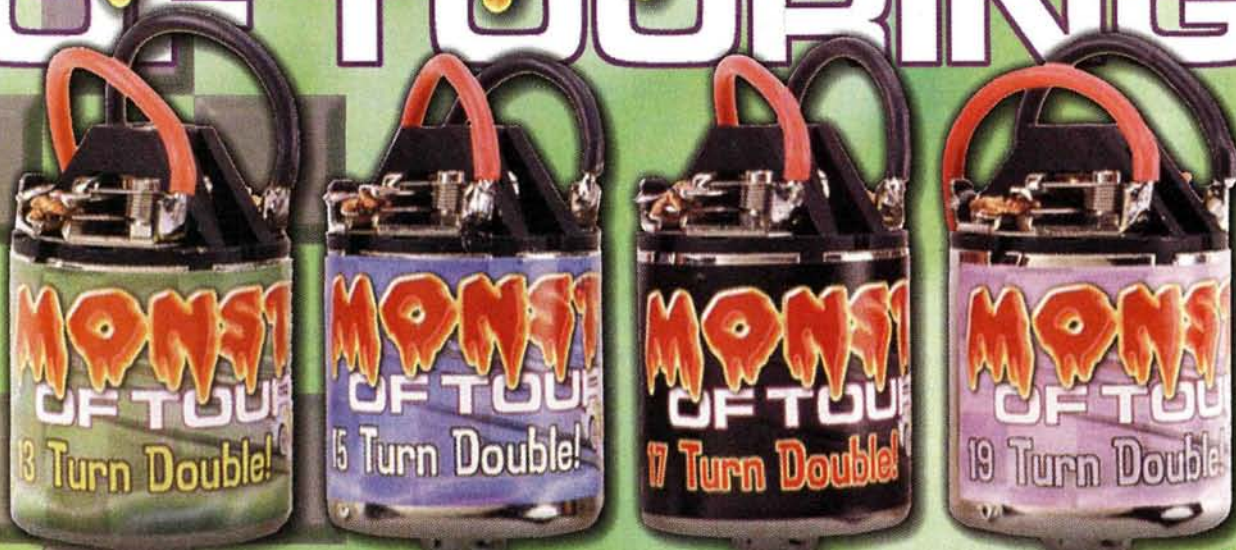
## MORE MACHINED MAGIC FROM ROBINSON



Well, lookee here ...! Rob Robinson has been at it again. These machined pulleys for the HPI RS4 series are machined from hard alloy billet that's then hard-anodized for incredible wear characteristics. The diff flanges are separately anodized and permanently attached, and the tooth profile has been custom tweaked to ensure perfect mesh and no belt climb-out. From left to right: one-piece layshaft and pulleys for electric RS4 series; diff pulleys for Super Nitro RS4 and Nitro RS4; drive pulleys for all Nitro RS4 series.

Rob Robinson says he's also working on smaller inboard drive pulleys for the Super Nitro RS4; they will lower the final drive ratio to improve acceleration. I'll keep you posted! Robinson Racing Products; 4968 Meadow View Dr., Mariposa, CA 95338; (209) 966-2465; fax (209) 966-5937.

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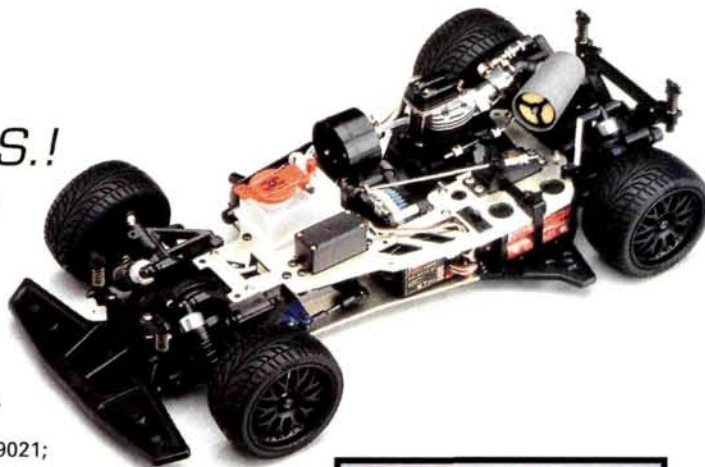
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## Kyosho SuperTen Four II hits U.S.!

First, modelers like our own Doug Huse started dropping 4-stroke model airplane mills into R/C cars, then O.S. Engines gave the 4-strokes-for-cars movement a big shove with its FS-26S-C engine, a thumper engineered just for cars. Now Kyosho offers this exciting pushrod powerplant as part of its latest SuperTen offering, the Four II. In addition to the aforementioned engine, the Four II includes a thicker, stronger steering bellcrank for reduced slop and more precise handling. All the other goodies you've come to expect from the SuperTen series (pivot ball suspension, shaft drive, disk brakes, blah, blah, blah) remain. Look for a "Thrash Test" really soon!

Great Planes Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



## Progressive Piggyback reservoirs now in colors

Progressive's great-looking and functional piggyback shock reservoirs have appeared on a couple of project trucks in the pages of *R/C Car Action* and are an excellent hop-up for Associated shocks or Progressive's own adjustable EDC units. The reservoirs are now available in blue, gold, red, silver, purple and black to match your ride, and they still offer 6061-T6 aluminum construction with closed-cell, foam, volume compensators.

Progressive Suspension Inc., 11129 G Ave., Hesperia, CA 92345; (760) 948-4012; fax (760) 948-4307.



## ROSE-COLORED GLASSES

Light conditions are often taken for granted but they can differ, thereby drastically affecting a driver's vision—including the all-important depth perception. Zurich Intl. has developed many types of glasses for specific lighting conditions and has now added rose-colored lenses to their sunglasses line. These are intended for overcast conditions, which produce lower levels of light. On race days with low-level, highly



defused sunlight, these glasses will improve your vision. While normal dark-colored glasses shield your eyes from excessively bright light, Zurich's rose-colored glasses intensify color and contrast and make your car easier to see. Zurich sunglasses also shield against harmful UV rays and are made of a ballistic-grade polycarbonate plastic, so they can also serve as excellent safety glasses. Who says it's not good to view the world through rose-colored glasses?

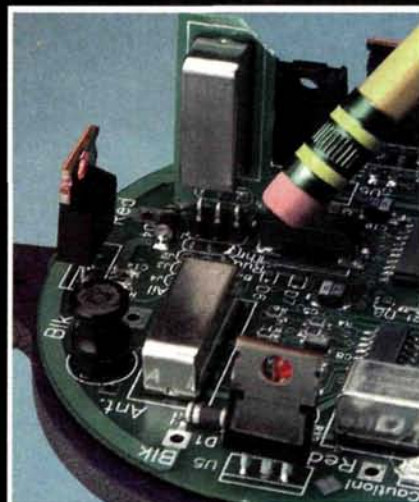
Zurich Intl., 3650 Keefer Rd., Chico, CA 95973; (800) 533-5665; fax (530) 893-9575.

## R/C SIGHTING

Every once in a while, there's an R/C flying machine that's so cool I just gotta show you guys. Even you diehard racers need to have some occasional R/C fun, too. The Roswell Flyer is one such item. Bringing you the info, however, wasn't easy; at times, it was downright dangerous.

After a long period of silence followed by many ambiguous denials, Area Fifty One Technology (A.F.O.T.) has now come clean with its top-secret Roswell Project. I guess it was the spy shot that made them finally "fess up." Well guys, here it is close up. The 22.25-inch-diameter—from strut tip to strut tip—Roswell Flyer.

You're right; this isn't the first four-point hovercraft. There is a similar gyro-controlled flying saucer that is smaller. The big difference with the Roswell Flyer is not its "bigness" but those three PEZ-candy-shaped silver canisters. Within each one lies the smallest piezometric crystal gyroscope I've ever seen in the hobby arena. These little units, responsible for flight stability, have super-fast response times and very low current drain, so more of the onboard battery capacity is reserved for powering the four drive motors. In short, flight performance and duration are optimized. Rumor has it, a microcamera-equipped version could be a reality in 2000.



Anyway, I'll get mine built as soon as I can, so stayed tuned to *Radio Control Car Action* (or "The X-Files") for further information and/or microfilm enlargements on A.F.O.T.'s Roswell Flyer. On the other hand, since the "cat" (or should I say "saucer") is out of the bag, I suppose you could just contact the friendly guys at A.F.O.T.

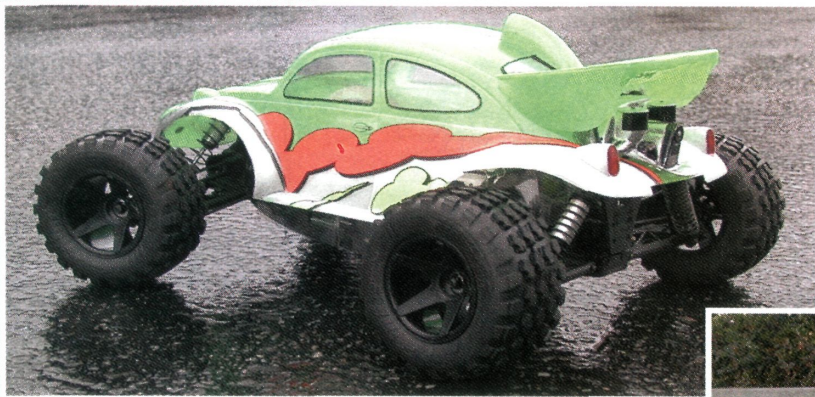
A.F.O.T.; distributed by Impulse Inc., 7250 Peak Dr., Las Vegas, NV 89128; (702) 948-1100; (800) 328-0184.



## Baja Bug

Need a new look for your HPI RS4 MT? The new Baja Bug, complete with molded-in engine and add-on wing, will give your MT a whole new personality. For a scale, street-racer look, the Mitsubishi Eclipse is the hot ticket. I'm sure assistant editor Greg Vogel will be detailing one of these to look just like his "worked" Eagle Talon (the diamond-star variant of the Eclipse; please tell me you already knew that).

HPI, 15321 Barranca Pky., Irvine, CA 92618; (949) 753-1099; fax (949) 753-1098.



and Eclipse shells  
from **HPI**

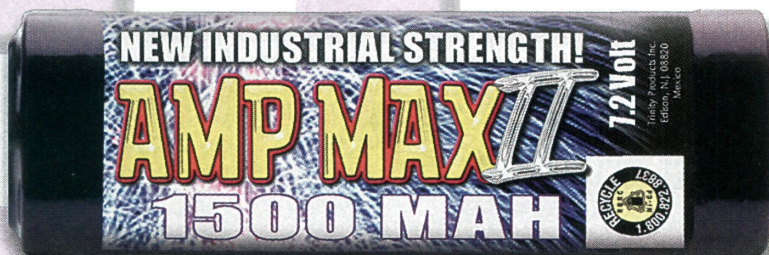


## Nitro TC3?

The electric TC3 hasn't even hit the shelves yet, but already, there's talk of a nitro-powered version. Actually, there has been talk of a nitro-powered TC3 since the first discussions of the electric TC3! According to A-Team designer Cliff Lett, nitro adaptability was a design prerequisite for the innovative tourer. From what I know about the electric version, the nitro version is bound to be a bad asphalt burner. Stay tuned for this one.

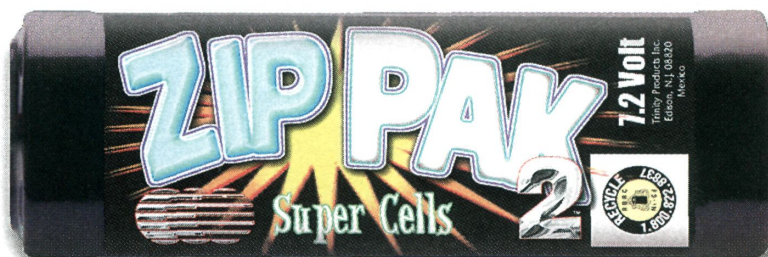


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### Monster Collection

Steve Allison of Phoenix, AZ, shows us his lineup of R/C cars. From left to right: a Kyosho Baja Beetle with 2-speed tranny with reverse and oil-filled shocks; Kyosho's Dodge Ram chassis topped off with a Caprice body, also featuring a 2-speed tranny with reverse, plus Dirt Hawg tires and long competition shocks. Next is a Tamiya King Blackfoot with a Gravedigger body and Kyosho Magnetic Mayhem motor; beside it is another King Blackfoot that includes an RS540 sport motor and 4-inch, gold, oil-filled shocks. At the end of the line is a USA-1 electric with a Nomad body, twin Magnetic Mayhem motors and a Super Rooster ESC. All the vehicles have Futaba 2PCKA Jr. radios, Futaba servos and full bearing sets.



### Cereal Racers

These brightly colored vehicles are owned by General Mills employee Shawn Copeland of Lewisville, TX (hence, the Cheerios paint scheme). Among the features of this HPI RS4 racer are a Taurus NASCAR body with paint by Pactra, an O.S. .12 CZZ engine, a DuraTrax Nitro Hawk tuned pipe, an HPI 2-speed tranny and a JR XR2 radio. Shawn's BRP Mini and Matchbox "Cheerios" rides complete the vitamin-fortified trio. Just hours after he took this photo, Shawn's RS4 had a close encounter with a large splinter sticking out from the track rail; it caught the right side of the body and ripped off the piece between the wheel wells and the windows. Shawn quickly patched it up with clear packing tape and adds, "It definitely has that 'raced' look now!"

### Dirt Devil

Jonathan Evan Smith, age 15, of Rancho Palos Verdes, CA, says this HPI RS4 Monster Truck had just finished "tearing up the road" when this shot was taken at Averil Park in San Pedro. A Trinity Speed Gems 17-turn modified motor spins beneath the hood. It's controlled by an Airtronics Rival Sport radio and a Novak Explorer Sport ESC. Jonathan's uncle, Tom Borba, did the custom paint job. Says Jonathan, "This baby can handle mud, gravel, sand, rocks and probably even snow!"



### Keep on Truckin'

This big rig belongs to Scott Trowbridge of Novato, CA. The Tamiya Ford Aeromax with tank includes full ball bearings, aluminum rims, blue-anodized oil shocks, light sets with a back-up beeper and motorized support legs. It's controlled by a Futaba Attack 4 with three high-torque servos and a Tekin Titan ESC, and it's powered by a 15-turn Reedy modified. Its juice comes from a Perfect Match racing battery. The "sick-looking" body was custom painted by Chris, an employee of Scott's local hobby shop.



### Du Pont DS

Brad Turek of Huntington Beach, CA, says this RC10 DS Racer team kit is the first car he has built—at age 43! It features a Novak Racer EX, a Hitec FM radio and a Trinity GT-1 12-turn triple motor. Brad topped off his DS with a Protoform Monte Carlo body, Slixx decals and a sweet Du Pont paint job. He estimates that his Rainbow Warrior can hit speeds of about 40 to 45mph.



### Snow King

Mike Dulan of Wadsworth, IL, specially rigged this Associated RC10 GT to play in the snow. A combination of Pro-Line Dirt Hawgs and Sand Paw tires mounted on HPI chrome wheels provide traction. Other features include a Futaba Magnum Junior radio, Futaba 148 servos and ball bearings. Mike put the receiver and batteries into balloons to protect them from water, and he changes air filters often between runs to prevent melted snow from being sucked into the engine. According to Mike, "Running in the snow is a very good way to hone your driving skills ... and when you're done playing, your truck is spotlessly clean! Just dry it off and put it away."

### Grade "A" DS

Donald Meszaros of St. Augustine, FL, built this sharp-looking Associated RC10 DS. It has full ball bearings, a 12-turn Reedy TCZ modified motor, an LRP F1 Bullet ESC and 2000mAh batteries, and it's controlled by a Hitec FM radio. Don painted the Bolink Superbird body and used fine-line tape to mask off the numbers—freehand. He intends to pass this car on to his son someday—if he gets good grades! This stylin' DS is a definite incentive.



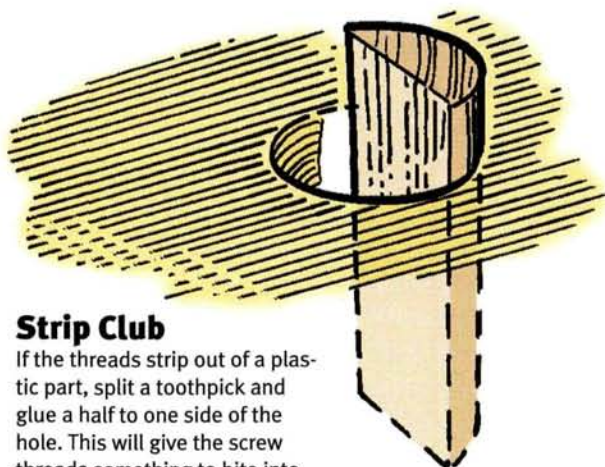
### Associated Assault

Aaron Eslinger of Faucett, MO, writes that his Team Associated RC10GT is powered by an O.S. 12CV with O'Donnell head. This vehicle, which has seen some race time, also features MIP CVDs and clutch, Pro-Line velocity wheels, Pro-Line BowTies, Hitec 525 servos and receiver and Lunsford titanium throughout. The RC10B3 on the right is powered by a Trinity Midnight 2 stock motor, a Tekin G12C3 speedo and a Trinity 2000mAh matched battery pack. An Airtronics micro receiver and Hitec 525 servo round out the onboard electronics. Both are controlled by an Airtronics M8 radio and sport R/C Car Action stickers; nice touch!



BY JIM NEWMAN

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



## Strip Club

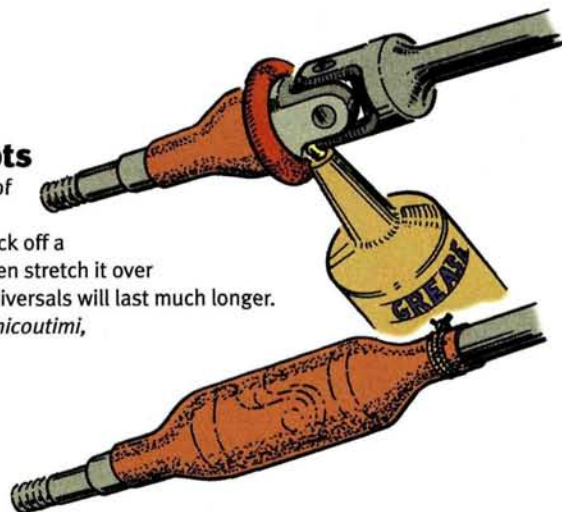
If the threads strip out of a plastic part, split a toothpick and glue a half to one side of the hole. This will give the screw threads something to bite into.

*Andy Nguyen, Des Moines, WA*

## Pair of Boots

To keep dirt out of your universal joints, cut the neck off a party balloon, then stretch it over the joint. Your universals will last much longer.

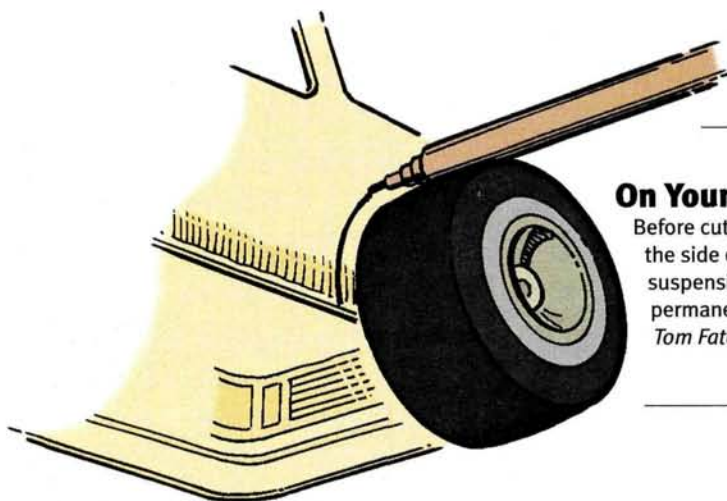
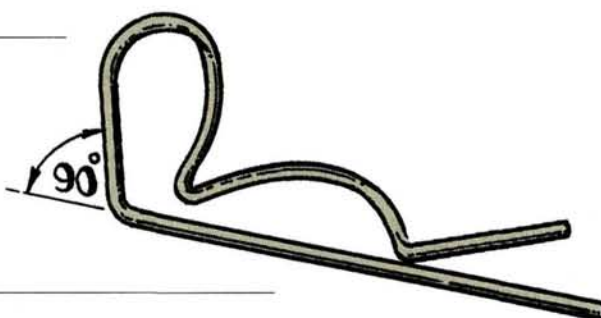
*Mario Duguay, Chicoutimi, Quebec, Canada*



## Bent Out of Shape

Body clips are much easier to extract from the posts if you bend the loop up 90 degrees before you insert them. This will allow you to grab them more easily for faster pit work.

*Robby Brown, W. Warwick, RI*



## On Your Marks

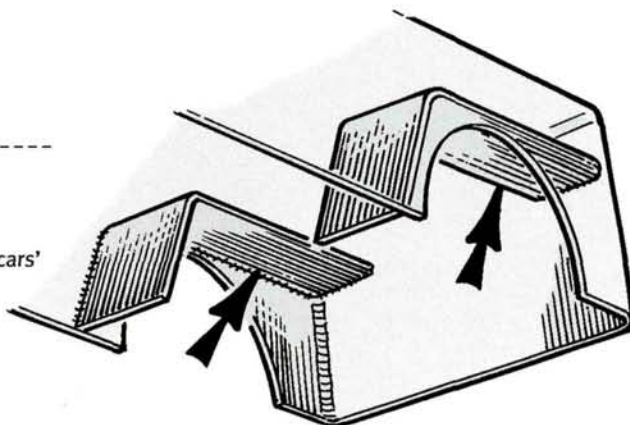
Before cutting out the wheel wells, put a wheel against the side of the body where it will be at the top of the suspension stroke, then draw around it with a fine-point permanent marker. You now have a cutting line.

*Tom Fatout, Littleton, CO*

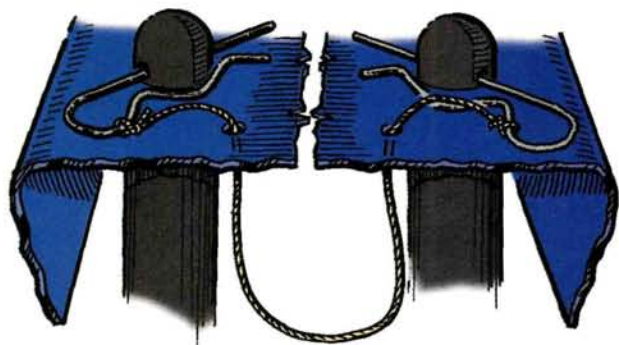
## Fender Bender

Install scrap plastic inner fenders to keep dirt away from your cars' electronics. Use CA or Shoe-Goo to glue the fenders inside the body. Be sure to allow enough room for the suspension to operate.

*Tomoo Fujii, Blaine, WA*



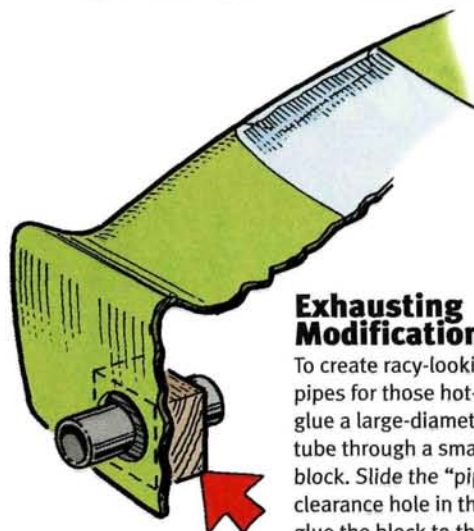




## String 'em Along

Drill a small hole in the body next to each body post, then thread thin string through the holes and tie the clips to each other so they cannot become lost.

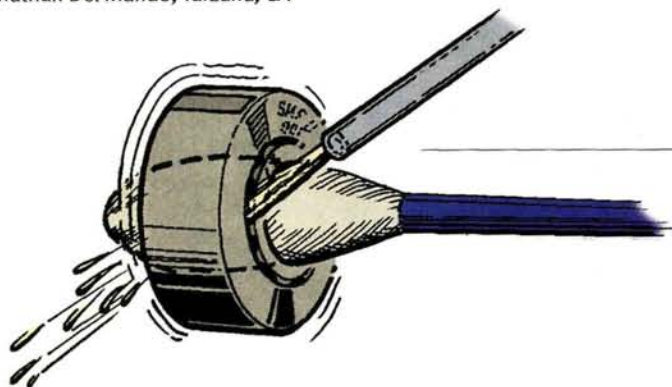
*Jonathan Del Mundo, Tarzana, CA*



## Exhausting Modification

To create racy-looking dummy pipes for those hot-rod projects, glue a large-diameter aluminum tube through a small wooden block. Slide the "pipe" through a clearance hole in the body, then glue the block to the underside of the shell. For a chrome-like finish, polish the aluminum tube.

*Adam Ball, Jarrettsville, MD*



## A Q-Tip Tip

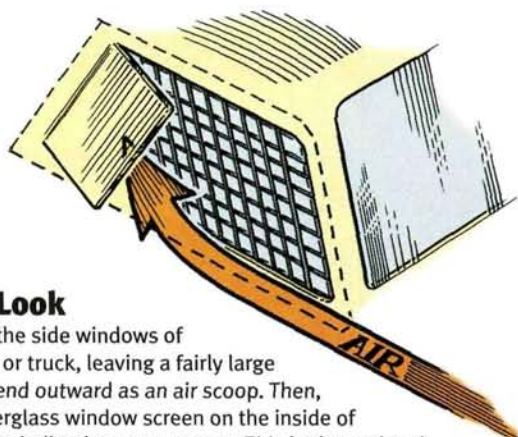
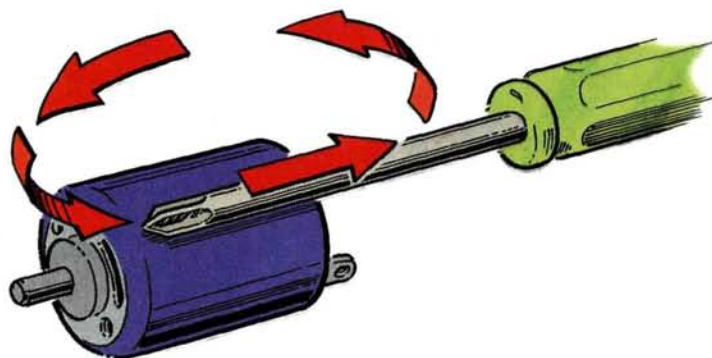
Cotton swabs fit snugly inside most bearings and provide a firm hold when you clean the bearing with spray solvent.

*Dusty Holland, Hesperia, CA*

## Sticky Screwdriver

A magnetic screwdriver will hold screws on its tip while you lower them into deep recesses. To magnetize your screwdriver, stroke it along a motor case in one direction only. Half a dozen strokes should be enough.

*Matt Barr, Butler, PA*



## Cool Look

Cut out the side windows of your car or truck, leaving a fairly large tab to bend outward as an air scoop. Then, glue fiberglass window screen on the inside of the body shell to keep out stones. This looks cool and helps cooling!

*Dondi Johnson, Newark, DE*



## The Main Attraction

Glue a magnet to the chassis or body of your car so that you can park the body clips on it while you work.

*Milo Ferrazzoli, N. Kingston, RI*





**ROBINSON RACING PRODUCTS**

## TROUBLESHOOTING

BY DOUG MERTES • ILLUSTRATIONS BY JIM NEWMAN

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at **Radio Control Car Action**, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, **Radio Control Car Action**, 100 East Ridge, Ridgefield, CT 06877-4606 USA. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.



### Mighty Meltdown

For a while after I built it, my Associated RC10GT gas-powered truck ran really well, but then it started to go slower and slower, even under full throttle. I disassembled the transmission and discovered that the main differential gear had kind of melted around the diff balls. I know I have to rebuild it, but I want to know how I can prevent this from happening again. Did I use too much black grease on the thrust bearing, or was it just too loose? Please help!  
ANDY ARCARO, Atlanta, GA

I talked to a few friends who run GTs and told them about your problem; they all said it's the result of running the diff assembly too loose. Under mondo gas power, the diff can easily slip off the line, and when landing off big jumps, this slipping can cause friction between the rings and balls. As we all know from high school physics, friction causes heat, and high heat melts plastic—hence, the ugly, melted mass in the transmission. You'll have to rebuild the diff using a new gear and new balls, and I highly recommend a new adjusting bolt and nut. The rings should be usable if you flip them over to the non-grooved side. You can use the black grease on the thrust bearing, but on the balls, use only Associated\* Clear Diff Lube. Following the directions given in your assembly manual, be sure to tighten the adjusting bolt properly; the instructions are very specific. If you can afford it, my racer buddies also recommended the replacement machined diff gear from Hammad Ghuman\*. Not only does it eliminate any chance of the dreaded meltdown, but it will also resist being chipped, and its teeth won't be deformed by the abuse meted out by really rough tracks and high-horsepower motors.

# Extreme Results From RRP.

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Precision machined one-at-a-time from a single piece of steel and then hardened. Fits ALL Associated and MIP shoes. (New 14T) RRP 2214 - RRP 2224.



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**Associated Blue Lightened Slipper Kit:**

The rear plate is hard anodized to reduce wear and the front plate is color treated. The front plate is designed to hold the slipper pad forcing the pad to slip on the rear plate. When pad shows sign of wear just flip it over for a new surface. Metal parts are CNC machined for a flawless fit. RRP 1515.



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— Richard Saxton

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## Speed Chaser

I have a new HPI RS4 Pro 2, and it really handles well. Which kind of motor will provide stout acceleration and awesome top speed?

I don't intend to race, but I mess around with my friends in the parking lot, and it would be nice to be the fastest guy around! I've been using a low-turn Trinity Speed Gem motor, and that's pretty good, but can you recommend something with more punch?

I'm also curious about stock motors: are they all 27 turns? And what does it mean when manufacturers talk about 36-degree motors?

PHIL BONNARO  
Phoenix, AZ



TIM NEWMAN '99

I suggest that you shoot for a hand-wound 10-, 11-, or 12-turn from a major manufacturer. Trust me; with a set of premium batteries, that kind of motor will produce enough awe-inspiring speed to make you the talk of the track.

In the U.S., all of the motors meant for ROAR stock-class competition have armatures with 27 single turns of 22-gauge wire, and the timing on the bushing-equipped can is locked at 24 degrees; 36-degree

motors typically use the same kind of 27-turn armature and bushings, but the motor can have 36 degrees of fixed timing. This much advanced timing produces a little more power and a greater amp draw than a 24-degree motor. If you ever decide to race, keep in mind that some organizations and local tracks still allow 36-degree motors in sanctioned competitions, but before you invest in one, you should check with the folks who run the races in your area.

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# RRP

## ROBINSON RACING PRODUCTS

### TROUBLESHOOTING

#### Corrosive Cleaning?

When I first got into the hobby, I bought a couple of used cars and trucks, and I've had a great time running them on the parking lot and in my backyard. Unfortunately, they're all dirty and gritty now, so I want to clean them; I want to tear them down, but what should I use to remove the dirt and grease? Can I use solvent on the parts, or would motor spray be better?

Are there certain parts that I shouldn't try to take apart? Will I need any special tools? I'd appreciate your advice.

**BILL PATRICKSON**  
Seattle, WA

Whoa, Bill; I hope this reply gets to you in time! Don't use harsh solvents such as lacquer thinner or motor spray on anything except metal. If you use them on Lexan and plastic, you'll be left with damaged or even ruined parts. Plastic parts are best cleaned by being soaked overnight in hot water and dishwashing detergent, which will remove the grease and grime. After the soaking, use an old toothbrush to remove any remaining dirt, then rinse the parts thoroughly and dry them with a paper towel.

It's a good idea to follow this disassembly, inspection and cleaning regimen every couple of months, especially if you run your vehicles a lot. You'll be amazed at the loose and/or out of adjustment—even missing—parts you'll find.

As far as special tools go, you can do a lot with a set of good basic hand tools as pliers and screwdrivers. Buy Allen drivers (also as hex wrenches) and drivers in sizes that fit your vehicle, too.



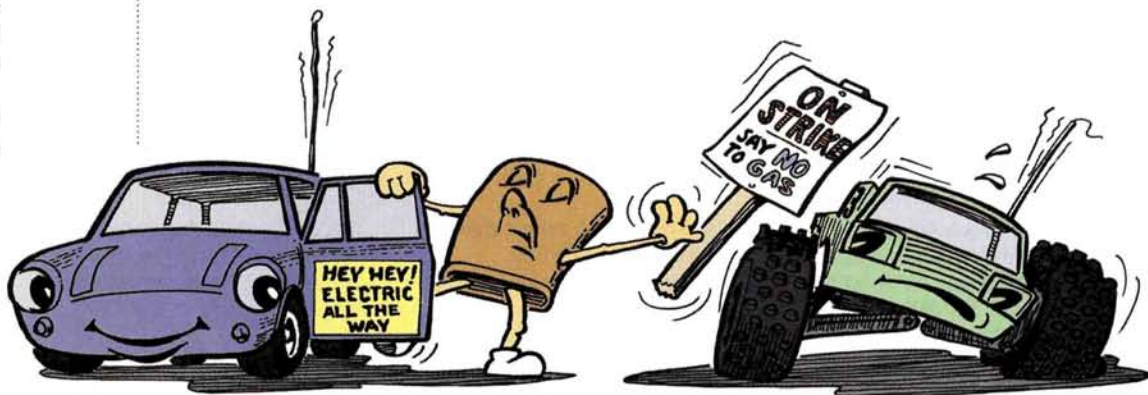
#### Picky Crystal

I have a problem with my gas truck that I can't solve. My brother and I both have RC10GTs with Futaba radios. My truck's set of receiver crystals stopped working, yet when I put them into my brother's system, they worked. I tried installing new batteries in my truck and radio, and still nothing. I put the truck away for a couple of weeks and then took it out to try it again. It worked!—for all of about 30 seconds; it just took off, and I had no control. I won't go into how it stopped, but let's just say it wasn't pretty. What's wrong with my truck?

**RYAN J. REED**, Monroe, WA

Ryan, it sounds as if you have the same problem as many others have encountered: you may have mistaken your receiver for the fuel tank—well, not literally, but when you filled your tank, did any fuel spill onto the receiver? It's mounted dangerously close to the fuel tank on the GTs. Many GT owners have a problem with fuel spilling onto the receiver; the electronics then burn out—a costly mistake. Your crystals work in your brother's truck, so they're obviously fine. It's time to save up for a new receiver.

To prevent this from happening again, you can protect your receiver by putting it into a balloon or a small fuelproof bag of some sort and use a zip-tie to close the opening. Or you can pick up an HPI\* or Kyosho\* molded cover to protect the receiver from fuel spills. ■





# Make your first race your best race

**O**K; for the past year or so, you and a half dozen of your friends have been hacking around in the backyard or out on the street. Maybe you're bored with the same old jumps, or maybe you're tired of chasing the dog around with your B3, or you just see yourself as the next Johnson/Kinwald/Pavidis. Whatever the motivation, you have decided to give organized racing a shot, even though you've never even witnessed an event. How do you prepare for your first exposure to formal racing? Whether you're heading to the local off-road track or indoor carpet facili-

ty, or taking the drivers' stand in the parking-lot wars, you'll find the following tips helpful in preparing for the big day. And make no mistake: it *will* be something to remember. Even if it's just a Sunday afternoon asphalt adventure, I guarantee that before it's all over, your heart will be pounding and your hands will be sweaty. That's what makes it so much fun! As much as I enjoy building, tuning and repairing radio control vehicles, nothing has had as profound an impact on me—or on the way I view myself—as the time I've spent competing on the track.

## HOW DO I BEGIN?

Start by contacting the race director or sponsoring organization to get the facts about what you'll need, what you'll have to do, and what you'll be expected to take. Many hobby shops sponsor weekend racing but if yours doesn't, the folks there can probably steer you in the right direction. Copy or remove the checklist that accompanies this article, fill it out, and use it as a guide to ensure that you have all the equipment and information you'll need. Make sure that you have good directions to the track and that you know what time the track opens and practice begins. Find out if you'll have access to AC power or if you will need to take an automobile battery or power supply for charging. Find out how many qualifying heats there will be for your class and how long they will last. The whole point of organized racing isn't necessarily to win; for many participants, it's an opportunity to run a final race against those drivers whose lap times for the day most closely matched their own. Usually, two or three qualifying races (called "heats") give the participants an opportunity to learn the track, correct their gearing, suspension and tire selection, and set their best times for that track layout. This is measured by the number of completed laps in the specified race length. Some electric classes run for four minutes; others last for five or eight minutes. Gas is a whole 'nother story, with longer qualifiers and much longer Mains—sometimes 45 minutes or more. If possible, arrive at the site early enough to help out with track setup. It's an opportunity to meet the race organizers before things get too busy, ask questions, contribute to the success of the event and make a few friends as well. As



a newbie, you're going to need all the knowledgeable friends you can find to make it through your first event without a major mishap; and don't be afraid to tell people it's your first time!

## OK; I'M AT THE TRACK—WHAT DO I DO NOW?

I always practice for at least one full battery pack before the first qualifying heat. That allows me to adjust my car or truck as necessary and discover any surprise problems that escaped my pre-race checkup, and it gives me needed confidence in my equipment. Although local events seldom have a "controlled" practice in which the type or class of cars allowed on the track is limited, virtually every track uses some sort of frequency-clip system. That ensures that only one person at a time is using a radio channel during prac-

tice, so make sure that you have the proper clip before you turn on your radio. And return it when you've finished because chances are good that someone else is waiting to use it. It's not considered good form to take the clip back to your pit space to make adjustments or put in a fresh battery to get more track time.

I'm a big believer in the old saying, "To finish first, first you have to finish"; my initial goal is to complete every race without breaking down. Watch a couple of R/C races, and you'll discover that simply surviving to the end of a qualifier will usually put you ahead of at least 40 percent of the rest of the field. Those are pretty good odds, and that focus is one of the reasons why I've gained a reputation as someone who makes it all the way to the end. I may not be flashy, but I'm consistent!

## WHO ARE THESE PEOPLE?

If you're used to bashing around with three or four friends at a time, it may surprise you to know that up to 10 drivers may race in a single heat. That many participants can be disconcerting to some drivers, and you need to be able to concentrate during the entire race. There will be lots of activity on the track, but you can't allow it to distract you; otherwise, disaster can result. Between the racing on the track, the spectators, dogs, kids and other pit activity, even a local weekend race day can take on a carnival atmosphere! That's why I recommend that first-timers charge up their battery packs and check their transmitter radios the night before their first time at the track. It's too easy to lose track of which packs have been charged, which ones have been used already, and whether the one in your car or truck will make it through the entire race. I've seen more than a few newcomers run out of battery well before the end of their first few heats because they installed the same pack as they used for 10 minutes of practice earlier in the day. Likewise, make sure that you have new alkalines or charged Ni-Cds in your transmitter, because interference and "glitching" problems can be caused by nearly depleted transmitter batteries.

## RADIOS AND LAP COUNTING

While we're talking frequencies, take a tip from a guy who's been around more than a few tracks: make sure that you know on which frequency (or "channel") your radio operates. There are six channels on 27 band and more than 30 on 75 band, and each racer must use a different channel to prevent his radio signals from interfering with



someone else's. It's a good idea to purchase an alternate set of crystals for your radio and receiver, just to guarantee your ability to run in your class without interference. Listen to the race organizer when he insists that all radios in the pits—that is, those that aren't being used in the race on the track at that moment—be turned off. This is done so the channels currently being used by the racers are the only ones carrying signals. It's not too cool to go around the corner to "test" your car, either; there's a good possibility that someone else will need that channel to be clear during their race. Be patient; pay attention, and wait for the race director to let you know when it's safe to turn on your equipment. Make sure that your repairs have been effective and, um—lose the antenna flag. That's a sure sign of geekdom.

Most local events are pretty sophisticated, with computer-controlled transponder lap counting and race management software. Transponders are small, battery-operated transmitter devices carried by each car; they enable the computer to note your lap time when your vehicle passes over the finish line. The body of your car will need a mounting hole for the transponder, so ask a fellow racer how large the hole should be and where it should go. Your entry information—class, type of car, name, frequency and alternates—is entered in the computer, and its race software then spits out a list of heats that includes who's racing in which classes, the race order and the frequency needed in each racer's radio. When the heats have been posted, check the bulletin board to see that your information was entered correctly. Be prepared to copy down which race you are participating in, its starting time and whether you will need to switch to one of your alternate frequencies before the heat starts. Don't hold up the action to change crystals; if you know you need to swap crystals, do so immediately.

## ALMOST TRACK TIME

Your heat will be called by race number and/or class, so listen carefully. About 10 minutes before you're due at the starting line, peak your batteries for the last time. For example, if you're in heat no. 10 and the heats are 5 minutes long, start

peaking your batteries during the middle of heat no. 8. (Figure 2½ minutes to the conclusion of heat 8; 3 minutes between heats; and another 5 minutes to run heat no. 9.) If there is any kind of technical inspection, add a few minutes to the process. Although tech inspection is often cursory at most local races, it still takes some time to check out all the cars. Again: to keep things on schedule, *be prepared*; find out ahead of time where you're supposed to be. When your race is called to the line, go up on the drivers' stand after the previous



**If you manage to keep off the walls and the corners and don't get into too many accidents, you'll have a much better chance of surviving until the end.**

racers have descended and retrieved their cars. Don't turn on your radio until you're reasonably certain that the last group of drivers have turned theirs off; there's always an outside chance that your frequency is the same as one of theirs. Turning your radio on prematurely could make another car go out of control—certainly not a good way to make friends at the track! Have a friend turn on your car and place it on the track. Drive it over the finish line so the computer can signal that your car's transponder is working properly. For the first qualifier, line up on the track in order by the race and transponder numbers that have been assigned to your car or truck.

Most race software uses a beep-

ing noise to start the race, so the announcer tells the racers that the heat will begin at the sound of this tone. When you hear it, take off in the proper direction and try to avoid hitting the other cars on the track as you circumnavigate the course. If you manage to keep off the walls and the corners and don't get into too many accidents, you'll have a much better chance of surviving until the end, and that should be your primary objective. Save the subtle moves—like passing competitors' cars—for later events, when you'll need less attention from the corner marshals. Above all, stay cool; don't yell or get angry, and remember that nobody learns how to do this stuff quickly or easily. Patience, Grasshopper.

## ASSUME THE MARSHALLING POSITION

When you've finished your first qualifier (well done! Tell me this isn't cool!), it's time to head to the track for corner marshalling duty. After every race, you're required to spend the next heat rescuing any cars that have become stranded, tangled, or otherwise stuck in place. Although whole articles have been written about this topic, you can learn a lot about marshalling just by watching. I also try to follow a few simple rules: work quickly, pay attention, don't step out in front of traffic and don't place a car in front of oncoming vehicles. It's easy to become distracted by events elsewhere, so pay attention to your particular part of the track, and run—*don't stroll*—to an accident that requires your assistance. Listen to the track announcer; he may alert you to stuck cars that you may not have noticed. Don't be intimidated by the remarks of the drivers up on the stand or their shouts of "Marshal, marshal!" Remember: they wouldn't need your help if they hadn't wrecked in the first place. On the other hand, you have a responsibility to resolve the Lexan carnage occurring out on the track, and it's one you should take seriously. Even the most talented drivers need the help of a marshal sometimes. Occasionally, you may need to fix a minor problem with a racer's car, such as a folded body, a pulled-out antenna tube, etc. Perform repairs only when there are no other problems on your section of the track.

When you've finished marshalling, take your car and radio back to the pits and check them for any damage from the first heat. When all the qualifying heats have been run in order, the whole thing begins again.

## MAIN EVENTS

After all the participants have run both of their qualifiers, race directors usually declare an open practice session while they format the main events in each class. If you practice during this session, be careful not to break your vehicle; I've seen more breakage during this free-for-all final practice than at any other time, and unless I'm desperate, I usually avoid it. Make sure that your battery is charged and your car is ready to go, and then check out the bulletin board when the announcer says the Mains have been posted. Racers are ranked in the order of their best qualifying time and then are grouped by class into main events according to that day's performance. The top eight or 10 vehicles will be placed in the A-main, the next group in the B-main, etc., until all racers have been ordered within their class. Mains are run just like qualifiers: line up in order, start at the beep and marshal afterward. The lower Mains (D, C, then B) normally run first, with A-mains held at the end of the day. This escalating action creates excitement, as the more experienced, capable drivers display skills that really get the crowd involved. By the time the A-mains roll around, a ring of spectators has usually surrounded the track, all of them anxious to catch the most competitive action of the day.

If you can, stick around after the Mains to help take down the track or clean up. Volunteering for this duty helps the organizers and will make them more likely to send an experienced racer or helpful tip your way when you need a little tuning assistance. Leave your pit area as clean as it was when you arrived, pack up your stuff (making certain that you have your car and radio) and head home. Chances are that you and your friends will have several hours' worth of bench-racing discussion ahead as you relive your first competitive experiences over and over. Congratulations; you're now a racer! ■



## A head-turning HPI RS4 Rally

**T**he HPI® RS4 Rally's unique inner shell provides both protection for the chassis and a great concours project for the meticulous modeler and the Impreza body that tops it off is loaded with detail. I wanted to add a bit of color and some unique action to the Rally, so let's dive headfirst into this "Concours Corner."

### HEAD START

The included detailed helmets can be assembled and installed in minutes. They look good with the addition of a few small decals, and no painting is required, but a little extra attention can take them a step beyond looking good. After joining the two halves, take a few minutes to smooth out the join with 400- or 600-grit sandpaper. Use a cotton ball or a paper towel and a splash of rubbing alcohol to clean the helmets before painting them, then wash them with soapy water (don't submerge them, or they'll fill with water). Once you've dried them, attach each one to a small piece of cardboard with the included screw. This makes the helmets easy to handle while masking and painting. Because the helmets are polystyrene (the same material used for static plastic models), they require enamel or acrylic-based paints; don't use paint designed for polycarbonate car bodies, as the color will dry with a matte finish.

It's easy to produce simple yet effective paintwork on the helmets. First, I sprayed on three coats of Testors® gloss white (no. 1245). After 24 hours, I applied liquid masking over the white and sprayed



*The design on this helmet camouflages where the two halves are joined. First, the helmet was sprayed with Testors Metallic Silver (no. 1246), then it was masked off and the final gloss black (no. 1247) was applied in three coats. The visor was cut from a vinyl sheet of Autographics® high-gloss chrome (no. 903).*



on four coats of Boyd's Grape Purple (no. 52904). Apply the color in light coats until you reach the desired shade. The protective helmet shield can be simulated by cutting out pieces of MonoKote®; choose your colors to match or accent the helmets' color.

I wanted to do something special with the interior, so I connected a servo to the driver's helmet so it would turn in unison with the front wheels. My first mission was to find a servo small enough

to fit under the interior shell without interfering with the chassis. In my search, I stopped by the local HobbyTown USA in Westminster, CO, and showed my project to the guys in the R/C department. Store manager James Miley came to my rescue with a miniservo that was perfectly suited to the job. The SL200 sub-microservo (no. EXRSL200), made by Expert Electronics® and distributed by Horizon Hobby Distributors is the tiniest servo I've

ever seen; it fits snugly underneath the shell. A small strip of scrap 0.030 Lexan was formed into a custom hanger bracket, and the servo was linked to the receiver with Futaba's® dual harness (AEC-13). This allows the driver's helmet to move along with the steering servo, so it looks as though the driver is looking in the direction in which the car is turning.

*To coordinate the color scheme of the body with the inner shell, I gave the multi-terrain Subaru a similar paint treatment inside and out.*



*An Expert Electronics SL200 sub-microservo was attached to a Lexan bracket to swivel the driver's and navigator's heads.*



*This double exposure shows the swivel head in action. Wheels go left, head goes left; you get the idea.*



## PAINTING TIPS

**W**ith a few simple masking tricks, you'll achieve excellent results with one or two colors. Here are some helmet-painting tips you can apply to other styrene projects as well.

- Clean paint lines are a result of using high-quality masking tape and being careful with paint application. Be sure to smooth out the edges of the tape. When you cut out pieces of tape, don't use the edges of the tape; always cut from the center of the tape. This gives a cleaner edge and better adhesion.

- If your paint scheme requires more than one color, plan the paint sequence prior to starting. For enamel-based paints, a general rule is to paint light areas first and then apply any dark colors.

- Allow plenty of time for the paint to cure (at least 24 to 48 hours) before applying masking tape or another color. Any paint flaws can be wet-sanded off with 400- or 600-grit sandpaper.

- For easier handling, attach the helmet to a piece of cardboard before painting. You'll be able to easily turn the helmet and move it to a safe place for drying without touching the freshly painted surfaces.

- You don't have to spray on loads of paint; just use enough to get proper coverage and achieve the correct shade. Three or four light coats are adequate. Wait at least 15 minutes between coats before spraying another coat. Don't try to apply too much paint at once, this will cause the paint to run or bleed under the masking tape.

*Striking helmet finishes needn't be complex. This helmet is a simple, two-color job brought to life with cut-vinyl stars. The Evel Knievel look is easy to do and always looks great.*



*The undertray was painted to match the interior/chassis cover and Subaru body shell.*



## UNDER COVER

I painted the interior/undertray to match the design I had chosen for the car's body. I sprayed on four coats of Pactra\* Grape (RC273) and backed it up with two coats of Indy Silver (RC262). The inner body set also includes a highly detailed decal sheet printed in full color on stretchy vinyl. For the best look and fit, trim the decals as closely as possible to the colored area. To

help position the graphics, I applied a quick shot of decal application fluid to each graphic and to the area where it was to be located. This allowed me to "float" each graphic into position.

If you have an HPI Rally, this is a fun, low-budget project to try, and the addition of a "man in motion" gets plenty of attention. It gives new meaning to that popular phrase, "keepin' it real!"

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

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Trinity Pro 24° Paradox  
Trinity Stock Arms  
Fantom Team Mods

**MOTOR BRUSHES**  
Fantom #F-315 #F-309 #F-312  
Trinity #4077 #4444 #4499 #4383  
Cam Motors #6220L #5812S  
Matrix #3018 #3028 #3502 #X-Cut  
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**DU-MOR PRODUCTS**  
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**INTEGY PRODUCTS**  
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Indi Octane Battery Tray  
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Indi 20 Discharger  
Indi Nuclear 7 Power Supply  
Eagle Comm Lathe II

**COMPETITION ELECTRONICS**  
Turbo Matcher 4  
Turbo 35

**MPH PRODUCTS**  
MPH 70 Tracker Cut Off  
MPH 75 Tracker with Bulbs  
MPH 100 Packrat Power Meter  
MPH 10 Diff Cushions

**WOLFE MOTORSPORTS**  
Full Line Springs & Things

**FANTOM MOTORS**  
Fantom Motor Dyno with Case

**COOPER RACING**  
Full Line Tires & Wheels

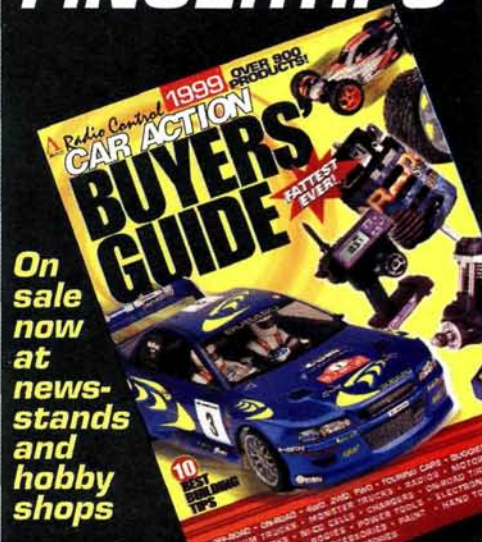
**IRRGANG PRODUCTS**  
Hubs, Axles, Ultimate Diff Assembly

Grade 5 Flanged Wheel Bearings  
Edge Comm Sticks  
Motor Brush Springs  
14 Gauge Silicone Wire  
Battery Braid 1/4 Flat  
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Battery Tape  
Grade #25 Diff. Balls  
Red & Black Connectors  
Motor Caps 0.1 50 Volt  
Integy Wrenches  
Integy Pinion Gears 48 & 64  
Energizer AA Batteries  
Sanyo AA Rechargeable  
Battery Shrink - 3 Colors  
S & K Pinion Pal  
S & K Motor Station  
4 Cell 270AA Receiver Pack  
5 Cell 1000 AE Receiver Pack

**QUILLEN ENGINEERING**  
Max-Zapp 1500 Battery Zapper  
This unit will do single cell or pack,  
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*A Must for the Serious Racer!*

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OF R/C AT YOUR  
FINGERTIPS**





# thrash TEST

1/10 scale electric

**T**he introduction of Tamiya's Clod Buster monster truck some 12 years ago sparked a following that still teems with "members" today. It's a truck that enjoys some of the most dedicated enthusiasts in a class that, although popular worldwide, is very much American. But despite the Clod's long-standing success,

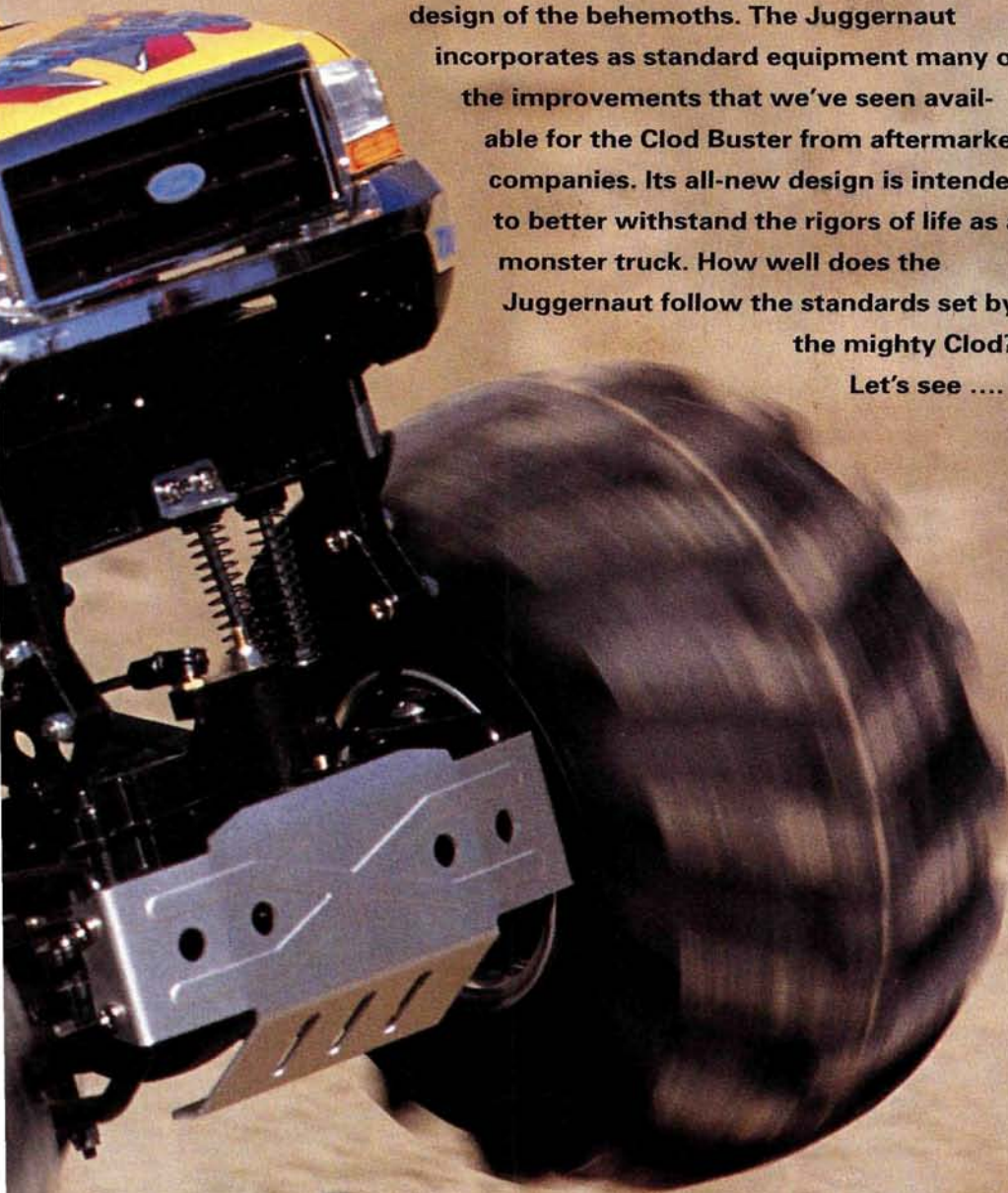




**TAMIYA**

monster-truck enthusiasts haven't really been offered too many new choices. There's consequently a thriving "cottage industry" devoted to making high-performance Clod hop-ups.

Well, worshipers of the terra tire, your wait is over. It has taken 12 years, but a new monster has reached our shores—Tamiya's\* new Juggernaut: a monster-class truck that is the next evolution in the design of the behemoths. The Juggernaut incorporates as standard equipment many of the improvements that we've seen available for the Clod Buster from aftermarket companies. Its all-new design is intended to better withstand the rigors of life as a monster truck. How well does the Juggernaut follow the standards set by the mighty Clod? Let's see ....



**CLD  
KILLER**



**JUGGERNAUT**

by Steve Pond





PHOTOS BY WALTER SIDAS

## s p e c s

**SCALE** 1/10  
**LIST PRICE** \$534

**DIMENSIONS**  
**Wheelbase** 11.02 in. (280mm)  
**Width** 14.75 in. (375mm)

**WEIGHT**  
**Gross, as tested** 177.2 oz. (5,024g)

**CHASSIS**  
**Type** Ladder  
**Material** Aluminum/ABS

**DRIVE TRAIN**  
**Type** Shaft  
**Primary** Pinion/spur  
**Drive shafts** Telescoping universal joint  
**Differential(s)** Metal bevel gear  
**Bearings/bushings** Bronze bushings  
**Final drive ratio** 32.7:1 (w/13-tooth pinion gears)

**SUSPENSION (F/R)**  
**Type** Solid-axle/leaf-spring/coil-over  
**Damping** None

**WHEELS**  
**Type** One-piece chrome-plated plastic  
**Dimensions (DxW)** 2.91x3.7 in. (74x94mm)

**TIRES**  
**Type** Rubber terra tread

**ELECTRICS**  
**Motor** Mabuchi 540 (2)  
**Battery** Not included  
**Speed control** Wiper—3 speeds, forward and reverse

**RADAR-CONFIRMED TOP SPEED\***  
10.6mph

\*Best speed achieved on level surface with stock gearing and tires using 10%-nitro fuel. Engine tuned for best all-around performance.

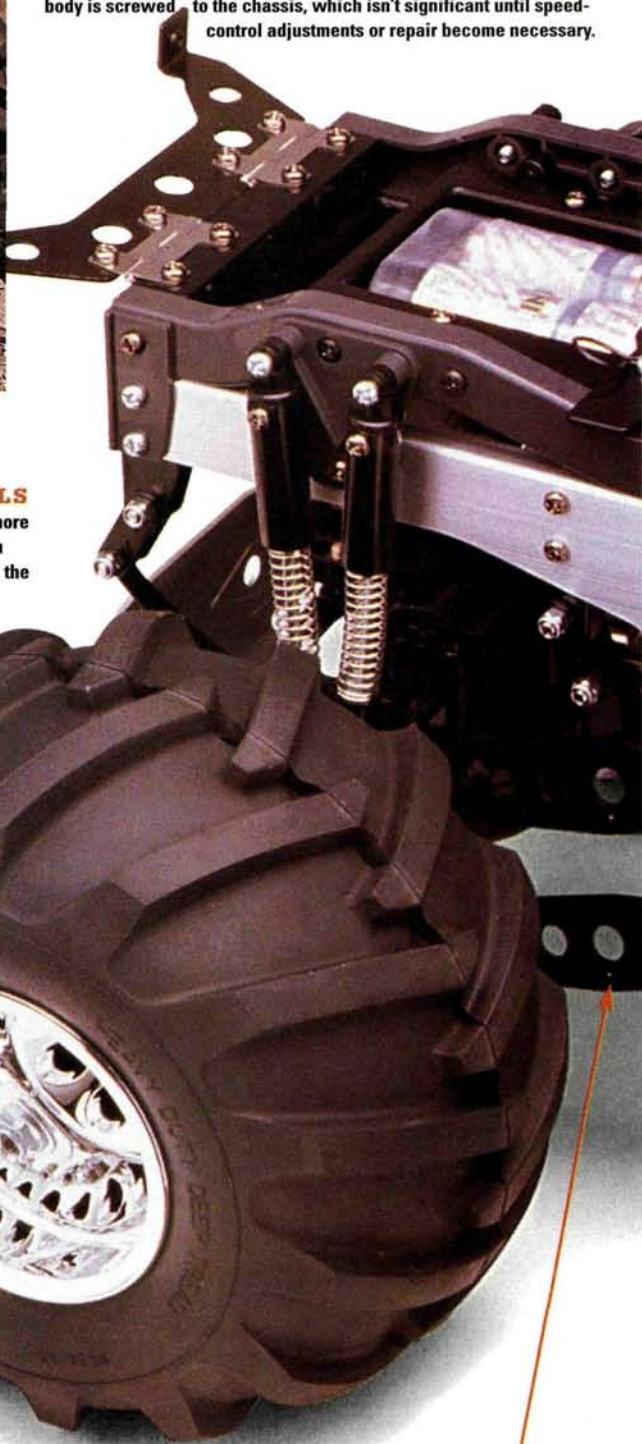
## TERRA TIRES AND CHROME-PLATED WHEELS

The Juggernaut's new tire profile looks more realistic, and is also more functional than the design used on the Clod. The rims are the same as the Clod's in every dimension except width: they are narrower by almost a 1/4 inch to suit the new tires. In typical Tamiya style, the wheels have a brilliant chrome finish that is second to none.

The new tires give up a little bit in width to the Clod as well, but the big benefit is that the tread is crowned. The contact patch of the new tread is less than that of the Clod's wide, flat-profile meats of old.

## FORD F-350 REGULAR CAB BODY

This has to be Tamiya's best bodywork yet. The Ford F-350 body's styling and impeccable detailing, for which Tamiya is well-known, combine to give us the best-looking, most detailed body ever seen on a monster truck. The body includes highly detailed clear lenses for the headlights, and the lights on the roll bar are ready for an optional lighting kit. The only bummer is that the taillights are decals instead of lenses, so it's difficult to add a complete set of functional lights. The pickup bed is mounted on hinges to provide access to the battery pack. Two body clips secure the bed, but they will unfortunately damage the paint when they're removed and reinstalled. The front of the body is screwed to the chassis, which isn't significant until speed-control adjustments or repair become necessary.



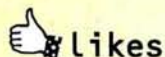
## FOUR-LINK SUSPENSION

The axles are held in alignment by the four-link suspension. Molded of ABS, the links are firmly attached to the aluminum chassis at one end and to the axle housings at the other. The ball ends are attached to the links with what look like turnbuckles, but aren't. It's simply threaded rod with a nut installed mid-drift to ease installation.



## ALUMINUM/ABS CHASSIS

The most notable asset to the Juggernaut's underpinnings is the chassis, which is a combination of aluminum and molded ABS plastic. With the exception of an ABS upper rail to which the radio plate, battery tray and shocks are attached, its side plates are entirely aluminum. A pair of ABS bulkheads join the side plates at each end. The transmission is mounted in the center of the chassis between the rails, and that provides additional support.



**Likes**

- Superior chassis design.
- Super-strong metal axle gears.
- Bronze bushings throughout.
- Superbly detailed body.
- Twin motor mount.



**dislikes**

- Overly stiff leaf springs limit suspension travel.
- Had to scrape chrome off rims before gluing tires on.
- Body clips scrape paint off the inside of the pickup bed.

## CENTRALLY LOCATED TRANSMISSION

The transmission is mounted in the center of the chassis and transfers power from the twin motors to the front and rear drive shafts. Before the power gets to the drive shafts, it goes through no less than four gear reductions, resulting in 18.69:1 transmission ratio. All of the gears in the transmission are molded plastic, but don't worry about durability; because of the high ratios involved, they are not working as hard as you might think.

## TWIN, STANDARD-ROTATION 540 MOTORS

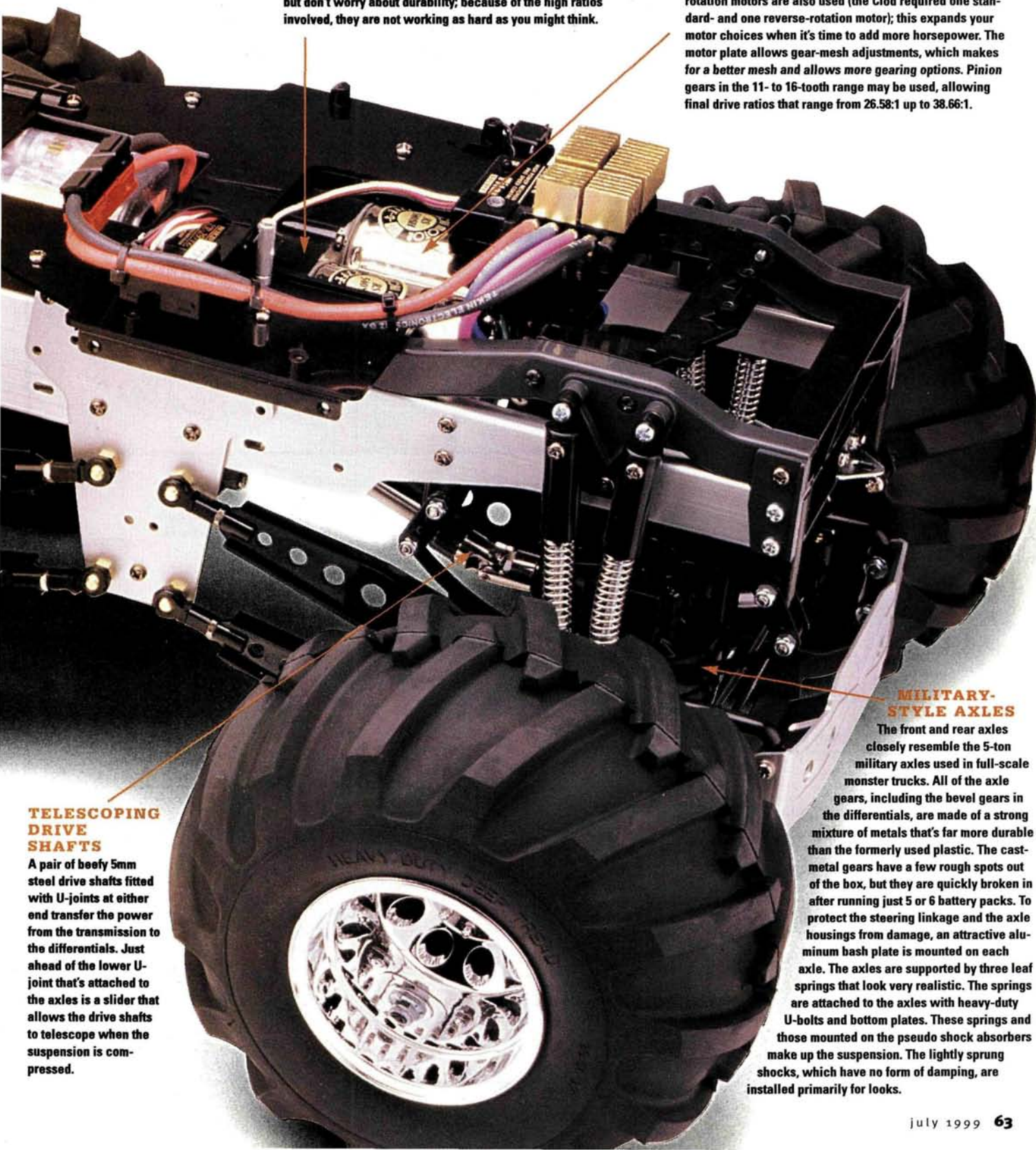
The motors are mounted high in the chassis on a twin-motor plate that drives a single, centrally located spur gear. This helps protect the motors from the elements when the Juggernaut treks through the dirt and mud. Standard-rotation motors are also used (the Clod required one standard- and one reverse-rotation motor); this expands your motor choices when it's time to add more horsepower. The motor plate allows gear-mesh adjustments, which makes for a better mesh and allows more gearing options. Pinion gears in the 11- to 16-tooth range may be used, allowing final drive ratios that range from 26.58:1 up to 38.66:1.

## TELESCOPING DRIVE SHAFTS

A pair of beefy 5mm steel drive shafts fitted with U-joints at either end transfer the power from the transmission to the differentials. Just ahead of the lower U-joint that's attached to the axles is a slider that allows the drive shafts to telescope when the suspension is compressed.

## MILITARY-STYLE AXLES

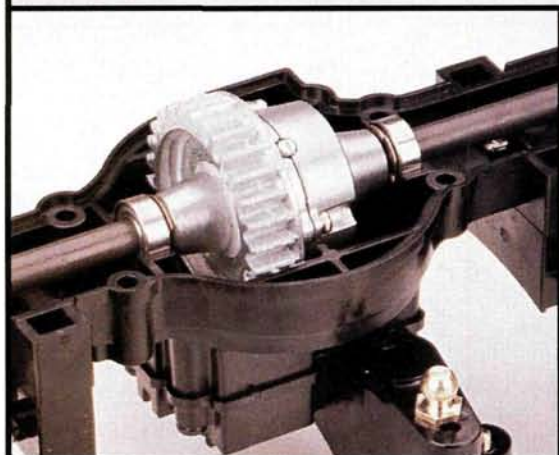
The front and rear axles closely resemble the 5-ton military axles used in full-scale monster trucks. All of the axle gears, including the bevel gears in the differentials, are made of a strong mixture of metals that's far more durable than the formerly used plastic. The cast-metal gears have a few rough spots out of the box, but they are quickly broken in after running just 5 or 6 battery packs. To protect the steering linkage and the axle housings from damage, an attractive aluminum bash plate is mounted on each axle. The axles are supported by three leaf springs that look very realistic. The springs are attached to the axles with heavy-duty U-bolts and bottom plates. These springs and those mounted on the pseudo shock absorbers make up the suspension. The lightly sprung shocks, which have no form of damping, are installed primarily for looks.



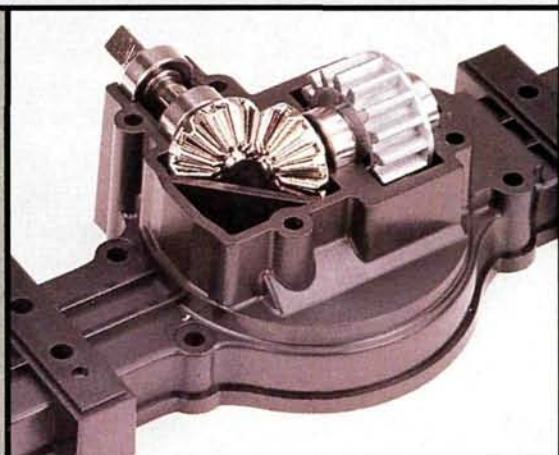




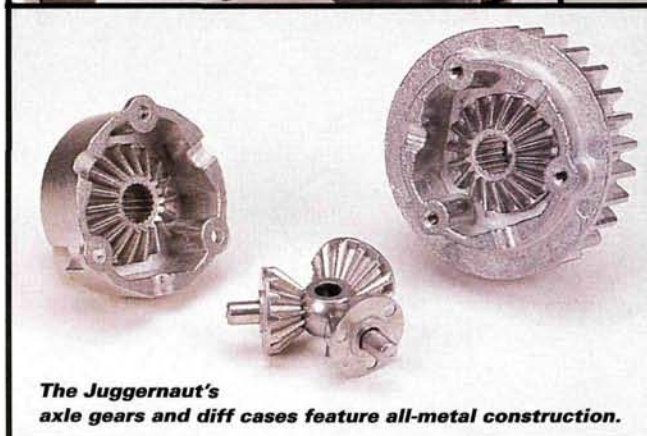
*The all-new ladder frame is made of aluminum and molded ABS plastic. The shocks, the radio and the battery trays are attached to the ABS rails; the aluminum plates are the attachment points for the transmission and the suspension links.*



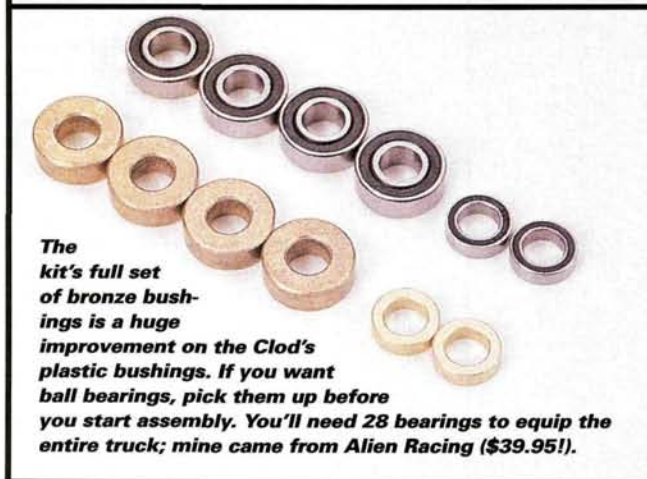
*Left: the beefy metal diff drives two splined-steel drive shafts that feature a dogbone end for the four-wheel-steering.*



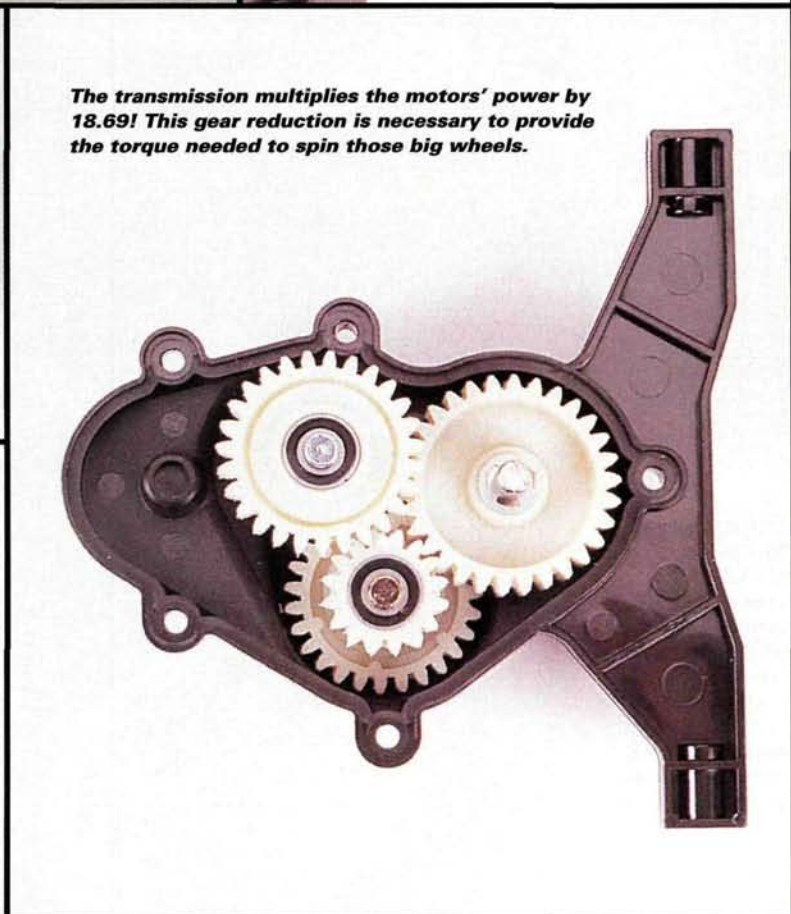
*Right: the axles' input gears are chrome plated for hardness and durability; two bushings (or optional bearings) support each shaft.*



*The Juggernaut's axle gears and diff cases feature all-metal construction.*

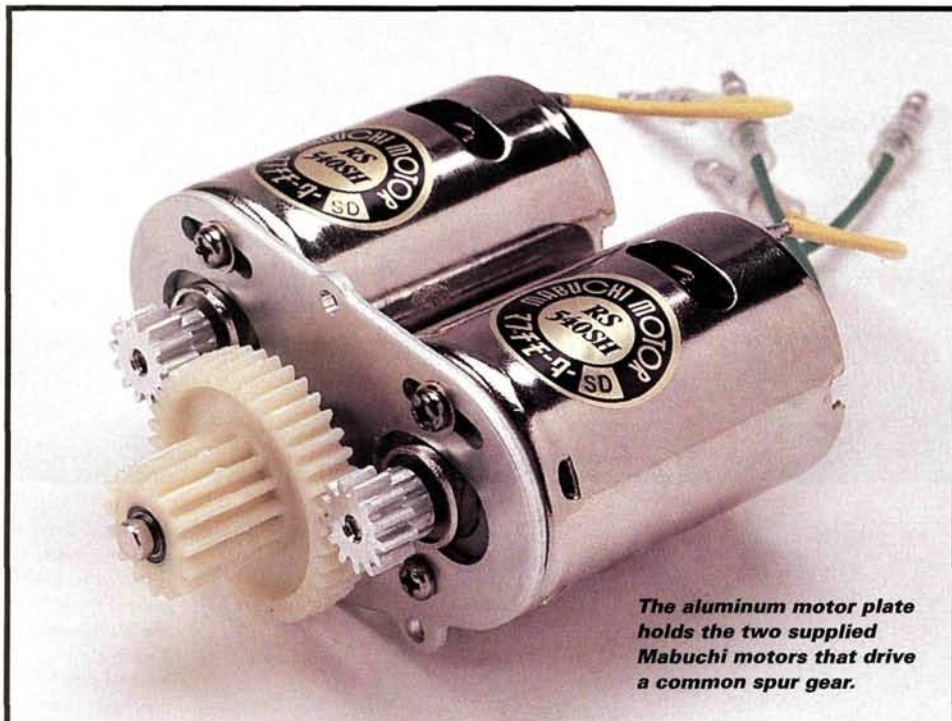


*The kit's full set of bronze bushings is a huge improvement on the Clod's plastic bushings. If you want ball bearings, pick them up before you start assembly. You'll need 28 bearings to equip the entire truck; mine came from Alien Racing (\$39.95!).*

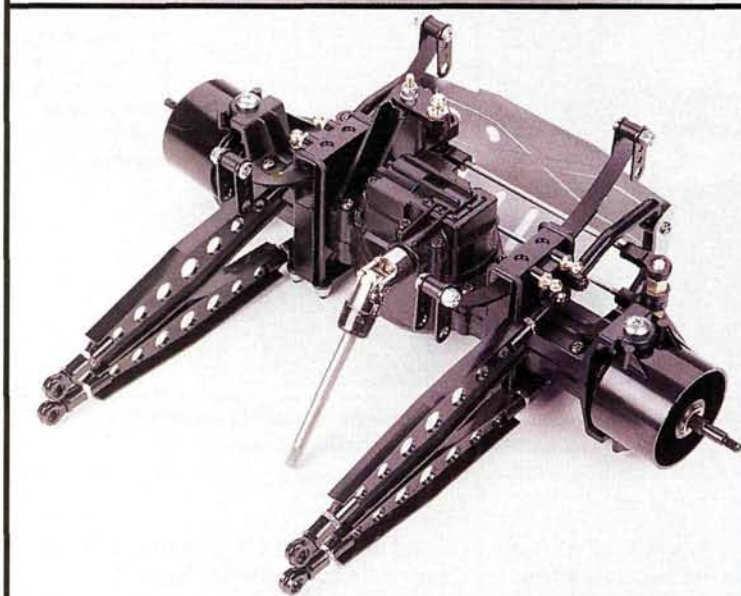


*The transmission multiplies the motors' power by 18.69! This gear reduction is necessary to provide the torque needed to spin those big wheels.*

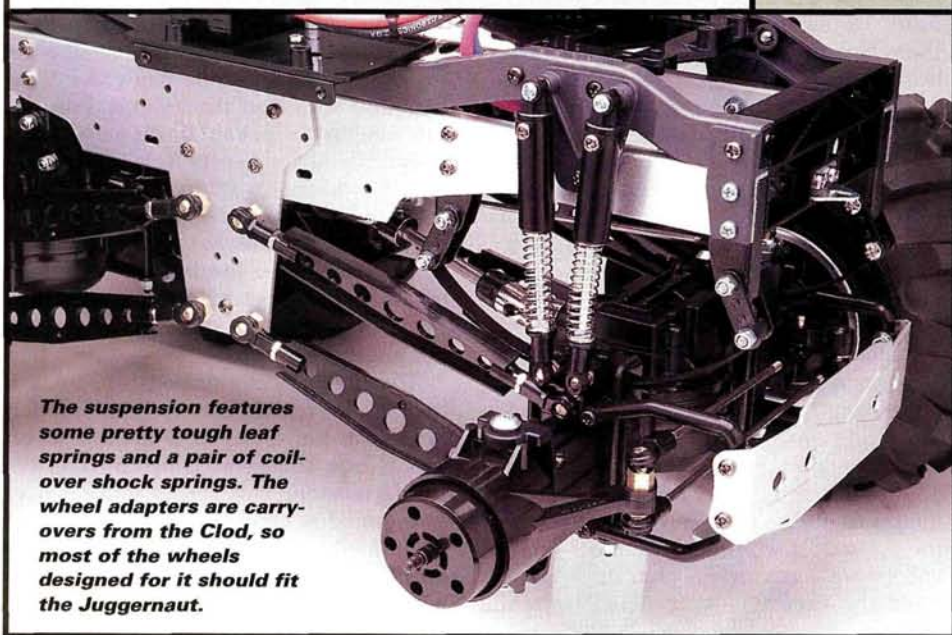




*The aluminum motor plate holds the two supplied Mabuchi motors that drive a common spur gear.*



*This completed axle is ready to be attached to the chassis. The black collar on the universal joint is the slider that allows the drive shaft to telescope when the suspension is compressed. Note the solid-looking leaf-spring U-bolts and metal leaf-spring shackles.*



*The suspension features some pretty tough leaf springs and a pair of coil-over shock springs. The wheel adapters are carry-overs from the Clod, so most of the wheels designed for it should fit the Juggernaut.*

## YOU'LL NEED

- 2-channel transmitter and receiver.
- 2 servos (1 high-torque for steering).
- 6-cell stick pack.
- CA to mount tires.

## BUILDING & SETUP TIPS

■ The Juggernaut has bronze bushings throughout, and that's a tremendous improvement on the Clod's plastic bushings. If you intend to install bearings, however, it's wise to pick them up before you get started. I picked up the full set—28 bearings—from Alien Racing (distributed by Bruckner Hobbies\*) for \$39.95! I combined these with the four that are included with the kit for a full set of 32 ball bearings.

■ The kit includes a generous tube of thread-locking compound to ensure that the metal-to-metal fasteners won't loosen. Use it!

■ When setting up the steering, all of the linkage rods must be properly adjusted. Adjust the linkage at each end of the truck so that the servo-savers are perfectly centered and the wheels point absolutely straight ahead. When you attach the rest of the linkage to the steering servo, they will also have to be adjusted so that the servo horn is at a perfect 90 degrees to the chassis side and the wheels point straight ahead. If the linkage isn't properly adjusted, the truck will have a tendency to "crab" and will not turn left and right equally well.

■ Have the radio gear ready when you assemble the chassis. You could install it at the end, if need be, but its installation will go more smoothly if it's ready when it's supposed to go in.

■ Pay close attention to how many screws are supposed to be installed in the chassis sides and to their positions. Some screws are supposed to be left out, and that can be confusing when you're trying to determine whether you've installed the ones that are supposed to be there. I forgot a few!

■ Strongly consider buying a powerful ESC such as Tekin's\* Titan. The kit includes a mechanical wiper control (MSC), and it's one of the better MSCs. In my experience, however, the MSC is the first thing to go even when driving just one motor, and the Juggernaut has two. It's a foregone conclusion that I would install an ESC that would accommodate the later installation of some hotter motors.

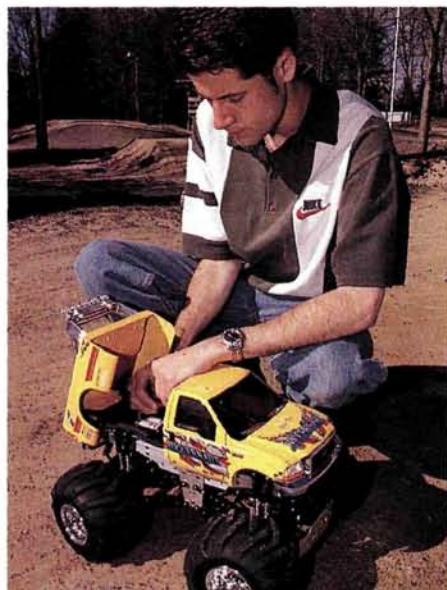
■ The ABS body is one of the most attractive you'll ever see on an R/C truck, but it has to be painted on the outside rather than on the inside, as is more usual on Lexan bodies. It's much more difficult to get a high-quality paint job when painting on the outside, so take your time! I took the easy way out and shipped the body off to Rich Muise at Motion Graphics\* for a simple, one-color job. He's an expert at this type of painting, so I knew it would look good.

■ Though the tires fit tightly, if they aren't glued to the rims, they will slip, especially if you run even mild mod motors. For the CA to make a tight bond, the chrome plating must be scraped off the rims where the tires will seat. I used an X-Acto knife and a good sharp wood chisel to scrape the chrome. Don't try to get away with gluing the tires without scraping off the chrome. The glue just won't stick.

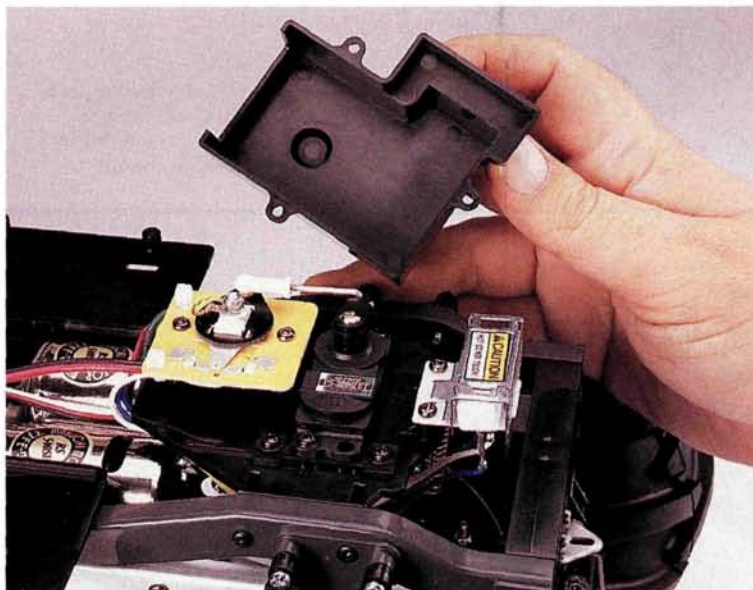




One of the Juggernaut's cooler aspects is that its shaft-drive system causes the chassis to twist under heavy acceleration (much like full-scale big trucks). Hard throttle tends to lift the left front wheel off the ground. I'm sure this wouldn't be helpful if you were racing, but it certainly has a very scale-like appeal.



The Juggernaut body's bed is hinged to allow quick access to the battery, which is underneath it.



The standard wiper speed control has a protective molded cover; Tamiya's mechanical controls are among the better ones, but a strong reversing electronic controller is highly recommended.

## TEST GEAR

• KO\* EX-1 radio with PS-2004FET servo • Tekin Titan ESC • Trinity\* RC-2000 EX-Tech 6-cell pack • Trinity Chameleon Spec modified motors • Alien Racing bearing set

## PERFORMANCE

The Juggernaut's shakedown run was in the carpeted hallway of our office building. Before I could go outside and play, I had to get the radio gear all trimmed up, and I also had to take the chassis down to the studio for staff photographer Walter Sidas to take a few shots while the truck was still clean; but I could still drive it to the studio ....

Still equipped with the stock Mabuchi 540 motors, the Juggernaut was able to pull the front wheels off the ground with each stab of full throttle. Granted, it was on a high-bite carpet, but that it can pull wheelies with the docile stock motors is pretty impressive. Did I mention that the studio is in the basement? Down the steps I went, with the Juggernaut leading the way (bodyless, of course). Hindsight tells me this was a pretty bad idea, as this was the only drivable Juggernaut in the country at the time, but I couldn't help thinking that it would be a great test. Fortunately, I didn't have to pay any price

for my stupidity; the Jugger lurched from step to step, right to the last one, where I put on the binders and it flipped over forward. Fortunately, it was the last step, so there was no damage, but it could have been curtains for me!

I ran the truck around, and the Mabuchi motors still impressed me with their decent torque, but they were a little pokey on overall power and top speed (10.6mph, according to the radar gun). I couldn't resist the urge to drop in some more horsepower. For the best part of the testing—dirt!—I snagged a pair of Trinity Chameleon spec modified motors and installed them. [Editor's note: "snagged" is Steve's code word for "robbed from Pete's and Greg's cars."]

I didn't consider what would happen with some hotter mod motors if the stout 32.7:1 final drive ratio allowed the stock motors to lift the front end of the truck off the ground. It wheelies even more—duh. Full clamp acceleration, even in dirt, will have the Juggernaut dragging its rear

bumper against the ground in no time (sorry about the paint, Rich). One of the Juggernaut's cooler aspects is that its shaft-drive system causes the chassis to twist under heavy acceleration (much like the big trucks). Hard throttle tends to lift the left front wheel off the ground. I'm sure this wouldn't be helpful if you were racing, but it certainly has a very scale-like appeal.

The twin-motor setup also has a very profound effect on braking. Installing the Tekin Titan adds brakes to the equation, and a stab at the binders will apply so much stopping power that the truck will stand up on its nose. Mental note: dial out some of the brakes.

The Juggernaut's suspension, or lack thereof, was no surprise. The combination of the stiff leaf springs and the springs on the pseudo shocks adds up to excessive spring tension. This spring tension may be required to compensate for the lack of damping, but if it weren't for the air holes in the rims, the Jugger would have a very bumpy ride.





## IS IT BETTER THAN THE CLOD?

by Kevin "Hinge Boy" Hetmanski

**S**o how does the Juggernaut compare with the Clod Buster? Since I've built many Clods, I should be able to give you a good idea of the differences between the two, and I'll tell you how the new guy stacks up.

At first glance, the Juggernaut looks more impressive than the Clod. Just like the Clod, it has two 540-size motors to help turn those massive tires, but they are tucked up inside the frame and are no longer mounted on independent gearboxes; they share one centrally located gear. This allows the use of two motors with the same rotation instead of one with regular and one with reverse rotation. Because the motors share a shaft, they work together to transfer the power to all four wheels. A Clod has independent gearboxes at each end. If the motor timing is off slightly, the front and rear wheels will turn at different speeds.

For scale appeal, the Juggernaut's shaft-drive system is very cool, and now that Steve has given me a chance to give it a good thrashing, I think it runs very well also. It seems to be very rugged, but only more running time and abuse will confirm this. Under heavy acceleration, the Juggernaut tends to lift its left front wheel, and if you intend to race, this could be a slight handicap, but I think the suspension has the potential to more than make up for it.

A Clod has two coil-over shocks at each wheel, but shock travel is limited by the shortage of space between the gearboxes and the chassis. The Juggernaut has two coil-overs at every corner, too, but Tamiya also includes a complete set of very realistic-looking leaf springs that look good but are very stiff. Combined with the coil springs, the leaf springs make for a very bouncy ride. As far as usable travel goes, the Juggernaut has all kinds of room between the axle and the chassis.

The chassis is just one of the truck's many improvements. After a few good thrashings with the Clod, you would almost always have blown out the bottom of the chassis where the suspension arms were attached. The Juggernaut has a light but strong aluminum chassis; you won't break anything on this sucker! The aluminum can also be polished, anodized, or machined to reduce weight.

Battery placement is also different. The Juggernaut's battery is under the tilt bed in the chassis; this can sort of make battery access a pain. The Clod has the battery mounted in the middle of the frame going side to side; you can access the battery from the outside of the body. In fairness, battery access is better on the Juggernaut than on the aftermarket Clod chassis I've tried.

The Juggernaut's tires are slightly taller and narrower than the Clod's. Their narrowness makes it a little easier for the servos to steer because they have a smaller contact patch on the ground.

There are some similarities: the Juggernaut's steering design is very close to the Clod's. It uses one servo mounted in the center of the chassis, and it also uses similar servo-savers mounted on the axles. The Juggernaut's rims are similar to the Clod's in every dimension except width (they're 0.225 inch narrower). The outer hubs, however, are the same. This will allow the installation of Clod Buster-size wheels and tires on the Juggernaut and vice versa.

The metal gears are welcome additions, as are the bronze bushings. The bronze bushings replace the Clod's rather useless plastic bushings. This makes it easier on the pocket because you can run with the bronze bushings for quite some time, but the plastic bushings almost always had to go right away. There wasn't the option of getting inexpensive bronze bushings, so you had to go with a costly set of bearings.

As a detail-oriented person, I find the Juggernaut's body Tamiya's best effort yet. The Clod has a very detailed Chevy body, but it's two generations old; the Ford F-350 body has late-model lines that are sure to appeal. I think the hinged bed is a big plus (they don't call me "Hinge Boy" for nothing). It's prime for a custom tilt-bed setup. The body is also set up to accept a light kit, and that will be one of the first options offered by Tamiya. The possibilities are endless!

In total, I think the Juggernaut is a better platform than the Clod Buster—more refined and certainly more durable. It doesn't have the extensive aftermarket support that the Clod currently enjoys, but I think it's only a matter of time. Many of the companies that make trick parts for the Clod will get behind the Juggernaut, and that will seal the deal. Juggernaut all the way!



The Juggernaut's mannerisms are relatively tame. It would require some real effort to get the truck out of shape running the kit motors. Adding the Chameleon motors pushes the performance envelope enough to require more caution, but the truck is still well-mannered enough to stay top side up.

The Juggernaut's steering system appears to be better in the durability department than the Clod's, as I bounced it off a few curbs with a full head of steam, and it came away unscathed. The steering still, however, has the annoying feel of oversteer that results from its having rear steering. Much like the Clod, the Juggernaut tends to steer more in the rear than it does in the front, and that makes the rear wash out a little more readily. When all is said and done, though, the truck is usually planted on all fours.

### FINAL THOUGHTS

A lot of faithful Clod enthusiasts have a ton of green invested in their machines, so it might take a while to pry them away from old faithful and move them on to the Juggernaut. Whether you're already a monster maniac or are considering a move in that direction, the Juggernaut is certainly a better foundation from

which to start. It has a stronger chassis and a much stronger drive train with stout metal gears. The complete set of bronze bushings is also a big plus compared with the old plastic ones. Moving the motors to the chassis eases installation and wiring, and it expands motor choices because the truck doesn't require a reverse-wound motor. The body, wheels and tires speak for themselves.

Is the Juggernaut the ultimate truck? No—at least, not compared with some of the custom monsters out there. It is, however, a very strong monster-truck foundation—a blank canvas of sorts. It has all the right ingredients to get you up and running, and it offers tremendous potential for the addition of that personal touch at some point down the road.

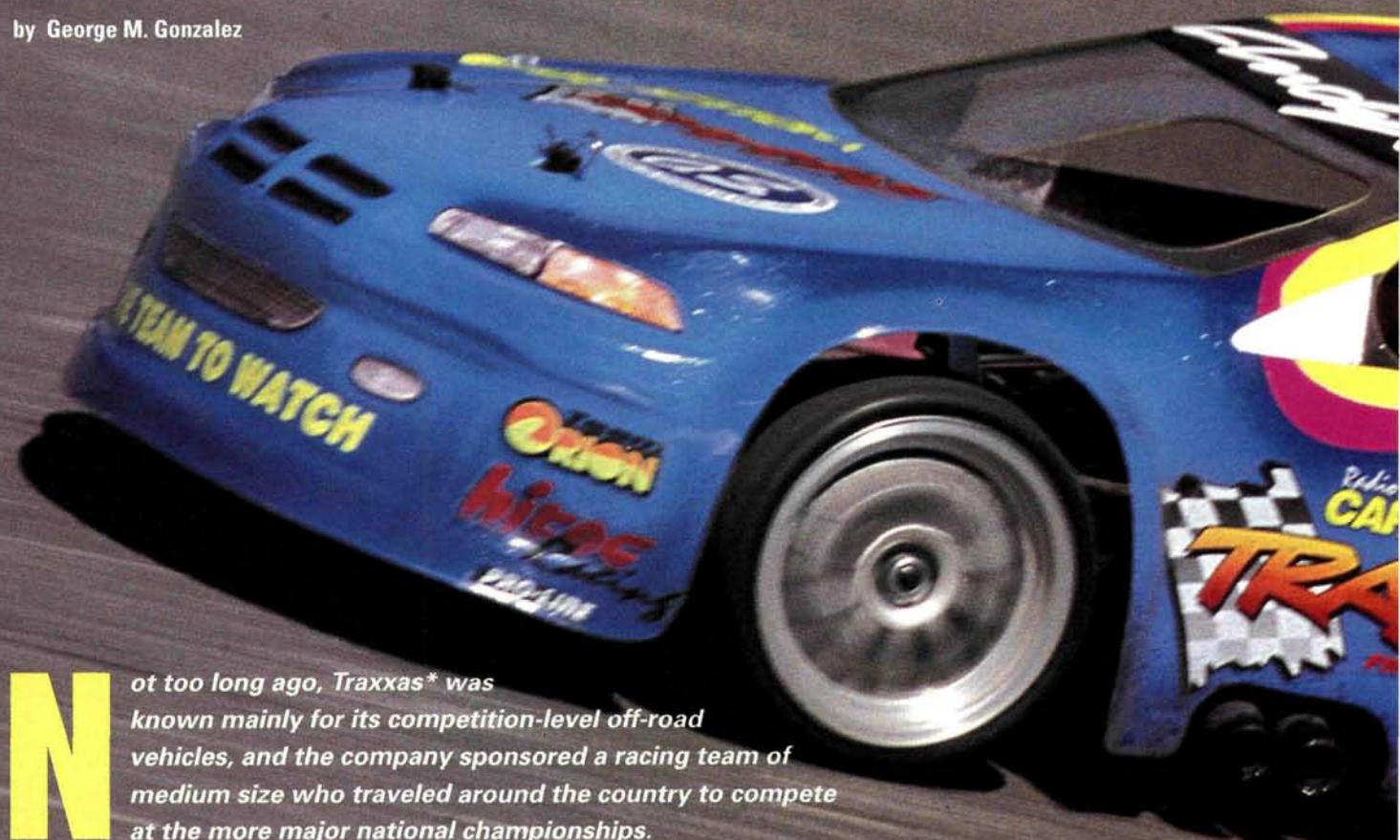
A number of aftermarket companies are already looking at making accessories for the Juggernaut, so it's bound to be only a matter of time before it builds a following like that of its predecessor. The only question that remains is what we should call all of us who become diehard Juggernaut fanatics. Jugheads?!

*\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.*



## Traxxas Nitro 4 Tec Pro

by George M. Gonzalez



**N**ot too long ago, Traxxas\* was known mainly for its competition-level off-road vehicles, and the company sponsored a racing team of medium size who traveled around the country to compete at the more major national championships.

Traxxas' top-of-the-line offerings were the TRX 3 buggy and SRT stadium racing truck, which both boasted racing features that rivaled Team Losi's and Team Associated's best efforts at the time. In fact, Traxxas team driver Rick Vehlow put the company in the A-main at almost every event in which he ran the TRX 3.

After several years of fielding a factory team, Traxxas decided to get out of the competition market and put all of its efforts and resources into producing high-quality, "sport-level," ready-to-run (RTR) R/C cars and trucks. It's interesting to note, though, that all of today's Traxxas off-road vehicles have many components that originated with the TRX 3 and SRT, and that has a lot to do with why the newer vehicles perform so well.

Even though the folks at Traxxas seemed to have opted to stay away from the racing end of the R/C market, they apparently just couldn't resist producing a racer to ride the wave of the surging touring-car segment—the limited-production, all the bells and whistles Nitro 4 Tec Pro. Hands down, this is the most race-ready vehicle Traxxas has ever produced. It looks as if "the team to watch" is back.

And even though Traxxas has absolutely no plans to field a racing team, the lucky few who get their hands on one of these cars will be rewarded with a true factory ride that might just make some sponsored drivers envious.



# to watch" is back



**SCALE** 1/10  
**LIST/STREET PRICES** \$365/\$335

## DIMENSIONS

**Wheelbase** 10.2 in. (259mm)  
**Width** 7.8 in. (198mm)

## WEIGHT

**Gross, RTR** 55 oz. (1,730g)

## CHASSIS

**Type** Double-deck  
**Material** Aluminum  
 lower/graphite upper

## s p e c s

### DRIVE TRAIN

**Type** Triple-belt 4WD  
**Primary** 2-speed clutch  
 bell/spur gears

**Drive shafts** Molded universal  
 sliders

**Differential(s)** Front and rear ball  
 diffs

**Clutch** 2-shoe  
**Bearings/bushings** Bearings

### SUSPENSION (F/R)

**Type** Upper and lower  
 arms/lower arms and  
 upper camber links

**Damping** Teflon-coated,  
 aluminum-body, oil-filled  
 coil-over shocks

### WHEELS

**Type** 2-inch one-piece plastic  
 mesh wheels w/aluminum  
 finish

### TIRES

**Type** 1.9-inch Pro-Line V-Rage  
 (S2 compound)

### POWERPLANT

Not included





## PERFORMANCE

California R/C Center in Anaheim has been the test site for many of my past "Thrash Tests" mainly because the racing program is organized, the people who race there are cool and the courses always have both technical and high-speed sections. There's also a large contingent of regular nitro TC racers, but on this particular race day, the threat of rain kept the turnout low—only enough racers to fill one complete heat (hey; all the more chance for me to win—right?).

I had a few chances to practice with the Pro before the qualifiers (such practice time is a rare commodity on normal race days). Because the temperature was down in the low 50s, I knew that the stock Pro-Line V-Rage tires in the S2 compound would not be the best choice; they're better for warmer conditions. I installed a complete set of Pro-Line S3 Slicks and used the molded inserts that came with the kit. The resulting tires looked and felt like Jaco capped tires—very impressive.

It took only a couple of adjustments to the Pro's front and rear swaybars to get it locked to the track's surface, and once I had set the shift point correctly, it was all systems go. I set the Pro up to have a slight push so that I would be forced to use more braking, which I've found lowers my lap times dramatically. The graphite disk-brake system provides smooth braking action without a hint of fading.

The O.S. engine provided plenty of punch, and the CVEC pipe distributed it evenly throughout the engine's powerband. I finished both qualifiers without a single glitch and ended up in third behind some talented locals.

My luck held during the Main, and even though I hit a board on the very last corner, I managed to finish in fourth as the car slid across the finish line on its lid. The Pro lived up to its name by providing an afternoon of excitement without demanding my attention the entire time. This was a good thing because I competed in two other classes that day, and the other cars I ran weren't quite as cooperative.

## WHEELS, TIRES AND MORE

The Pro has Pro-Line's V-Rage tires (molded in Pro-Line's sticky S2 compound) and a complete set of extremely trick, firm, molded tire inserts. The 2-inch chrome mesh wheels are equally impressive, and blue-anodized, 6061-T6-aluminum hex hubs complete the racing package.

## CENTERED FUEL TANK

One of the Pro's best features is its 75cc fuel-tank's position; it's in the center of the chassis. By placing the fuel tank in the center of the chassis, the car's handling characteristics won't change as the engine slowly consumes the fuel in the tank. The fuel tank's handy priming bulb works very well, and a two-piece rubber gasket helps to prevent the fuel from foaming inside the tank.

## 3-BELT DRIVE TRAIN

A conventional triple-belt drive train transfers the power to the front and rear ball diffs. A long, exterior-mounted center drive belt allows the use of oversize drive pulleys that reduce driveline friction and frees up space in the center of the chassis for the fuel tank. A complete set of stainless-steel ball bearings further reduces drive-train friction. The Pro also includes a blue-anodized, 6061-T6-aluminum pulley shaft to reduce drive-train mass, and it happens to match the chassis quite nicely. Power is transferred to the wheels via molded, universal slider shafts.

## TWO-SPEED TRANNY

The Pro comes equipped with a 2-speed tranny (this is an expensive option on many other racing vehicles). Unlike the RTR Nitro 4 Tec, the Pro includes Traxxas' optional race-oriented gear set that features lower, more conservative gearing. This means that the Pro will accelerate much quicker and reach its top speed in a much shorter distance—necessary for racing on smaller tracks. The 2-speed tranny features a clever locking mechanism that prevents the shift-point adjustment screw from coming loose. This ensures that the shift point will stay as you set it until you need to adjust it again.

## FOAM BUMPER

The Pro includes a foam front bumper, which, in my opinion, is absolutely necessary for racing.

## TITANIUM TIE RODS

The titanium tie rods are light, strong and easy to adjust. You'll also find an aluminum tie-rod wrench inside of the box to make camber adjustment a snap. That's not all: add a complete set of titanium hinge pins to the Pro's long list of standard equipment.

## TEST GEAR

Hitec\* Lynx 3D FM transmitter and dual conversion DCX receiver • Hitec HS-525BB high speed steering and HS-545 high torque throttle/brake servos • O.S. CV .12 engine with an O'Donnell lightweight connecting rod and heat-sink head and MIP\* boost bottle • Innovative Technologies\* CVEC tuned pipe • Team Orion 1000mAh nickel-metal-hydride receiver battery pack • Traxxas Top Fuel (20-percent nitro) • General Silicone\* fuel hose and tuned-pipe coupler • Du-Bro\* fuel filter • Andy's\* Nitro Rocket body



### GRAPHITE REAR SHOCK TOWER

The Pro's lightweight carbon-fiber rear shock tower goes well with the rest of the car's woven-graphite components. There are only two shock-mounting positions, but this limited choice simplifies things considerably. If you need more rear traction, the simplest solution is to mount one end of the shocks to the optional inner holes on the suspension arms and the other end of the shocks to the optional upper holes on the shock tower. The shocks will be closer to vertical but won't affect the previously set ride height. The Pro's adjustable rear body mounts will accommodate low-slung WSC-type bodies and traditional touring-car shells: simply loosen the adjustment screws and slide the body mounts up or down to fit the body.

### ALUMINUM-BODY SHOCKS

Traxxas' hard-anodized, Teflon-coated Big Bore shocks with factory-installed double-O-ring seals are standard issue. For additional tuning versatility, the kit also includes shock pistons in three valve rates, and an array of clip-on preload spacers allow accurate ride-height and tweak adjustments. The Pro also includes a complete set of relatively firm, "black" springs, high-quality silicone shock fluid and shock shafts in two lengths (29mm and 32mm) so you can set up the car for smooth or bumpy tracks.

### BALL-BEARING STEERING

The Pro's four 5x8x2.5mm bearings provide super-smooth action, and the blue-anodized bellcrank posts add color and support to the steering system; they're much better than the RTR Nitro 4 Tec's molded posts.

### HEX-DRIVE HARDWARE

The Pro is held together with a complete set of Allen-head machine screws. You won't find a single self-tapping, Phillips-head screw in this kit.

### PRO BALL DIFFS

Front and rear externally adjustable ball diffs with grade-10, 1/8-inch carbide diff balls, blue-anodized aluminum output shafts and dual internal ball bearings are standard. The diffs are ultra-smooth and last a long time between rebuilds.

### SUSPENSION

Up front, beefy front knuckle arms are attached to the upper and lower suspension arms with pillow balls; this reduces the number of pivot points and ensures a virtually slop-free front suspension. Caster is easy to adjust: slide the upper suspension arms forward (less caster) or rearward (more caster). Four caster settings are possible—12, 9.5, 8.5 and 6 degrees; the setting depends on how the included clip-on spacers are installed on the hinge pins. Two lower arm mounts are provided (0 and 3 degrees), and the Reactive Caster wedges that slide under the upper arm mounts allow dive or anti-dive characteristics to be added to the front suspension. The kit also includes front and rear swaybars that can be easily adjusted without disassembly and a graphite front hinge-pin brace.

### ENGINE SUPPORT EQUIPMENT

The Pro is the first nitro-powered R/C vehicle to leave the Traxxas facility without an engine. According to Traxxas, most Pros will probably end up in the hands of racers, most of whom prefer to choose their own engines and tuned pipes, and that's why these items are not included; this drastically lowers the kit's list price. The Pro does, however, include a blue-anodized "Perfect Fit" exhaust header (it will work with both pull-start and non-pull-start engines), an engine mount, 2-speed clutch bell, 2-shoe clutch, lightweight flywheel, clutch nut, fuel line and the necessary throttle and brake linkages.

### DOUBLE-DECK PRO CHASSIS

The Pro has the same blue-anodized 6061-T6-aluminum chassis as the RTR Nitro 4 Tec. The 2.5mm-thick chassis has raised sides to increase its rigidity, and the screw holes are all countersunk. The engine-mount holes are recessed, and the included flat-head engine-mounting screws do not protrude from the bottom of the chassis—very trick! On its own, the chassis plate is very rigid, and the molded chassis braces on both sides of the fuel tank and the engine and engine mounts are all integral parts of the chassis and together form an ultra rigid platform. The Pro has a 3-piece graphite upper deck and rear chassis brace that look absolutely sensational. On either side of the chassis, there's a graphite plate—one for the receiver and the other for the receiver battery pack. A 5-cell, 6V battery pack is highly recommended and fits the space provided perfectly.

### YOU'LL NEED

- 2-channel radio system with two servos.
- 4.8- to 6V battery pack to power the receiver and servos.
- .12 or .15 engine.
- Tuned pipe.
- Fuel.
- Glow-plug igniter.
- Fuel bottle.
- Lexan body and paint.
- CA glue for the tires.

### FACTORY OPTIONS

- 41-tooth first gear—part no. 4885.
- 37-tooth second gear—4886.
- Blue-anodized aluminum 15-groove pulleys (for front and rear belts)—4894X.
- 20-groove pulleys (for middle belt)—4895X.
- Hardened-steel diff yokes with U-joint (2)—4628X.
- Two-stage air filter—4062.
- 16-tooth clutch bell—4816.
- 20-tooth clutch bell—4820.

## BUILDING & SETUP TIPS

The Pro kit includes excellent instructions

that will get you through the building process without any major bottlenecks. For some of the more challenging steps, such as building the ball diffs and adjusting the rear belt tension, however, beginners might want to seek the help of someone with experience. And here are a few tips that may help:

■ Have the right tool for the right job: before you start, pick up a couple of high-quality hex wrenches (if you don't already have them). You'll need only two sizes: 5/64 inch (or 2mm) and 3/32 inch (or 2.5mm). Some of the Pro's molded components are extremely rigid, and that makes it difficult to install some of the fasteners with the L-shaped hex wrenches that are included with the kit.

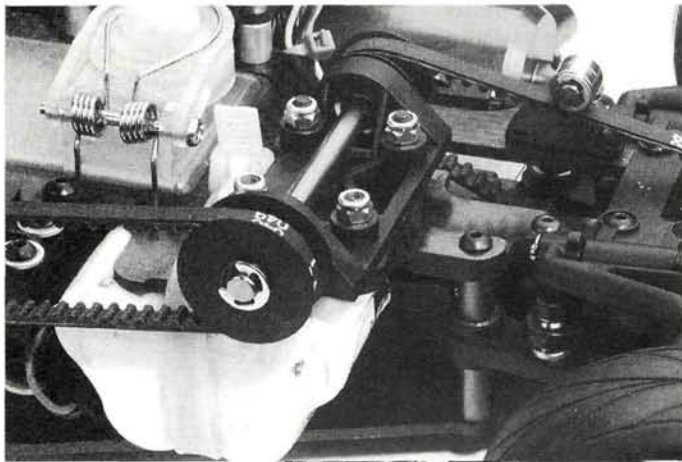
■ Use liquid thread-lock on every machine screw that is threaded into metal, especially the screws that secure the engine to the engine mount and the engine mount to the chassis.

■ Be careful not to over-tighten the grub screws that secure the drive yokes to the output shafts. Just tighten the screws until you feel a slight resistance, then back off 1/16 turn. Over-tightening the grub screws will strip the threads inside the molded drive yokes.

■ Engine selection: just about any short-throw, non-pull-start .12 or .15 engine that's designed to fit the Associated RC10GT may be bolted onto the Pro's engine mounts without any modification. When it comes to choosing a pull-start engine, however, your choices are limited. Even the O.S.\* CV-X .12 pull-start engine, which happens to be one of the best-selling powerplants, will not fit the Pro because its pull-start mechanism is too wide and does not fit the opening that's provided on the chassis. Many of the O.S. clone engines that are available will not fit the Pro for similar reasons. I strongly recommend that you install a non-pull-start engine and pick up a starter box; after all, the Pro is a flat-out racecar. If you're adamant about installing a pull-start engine, call Traxxas to get the scoop on which ones will fit.

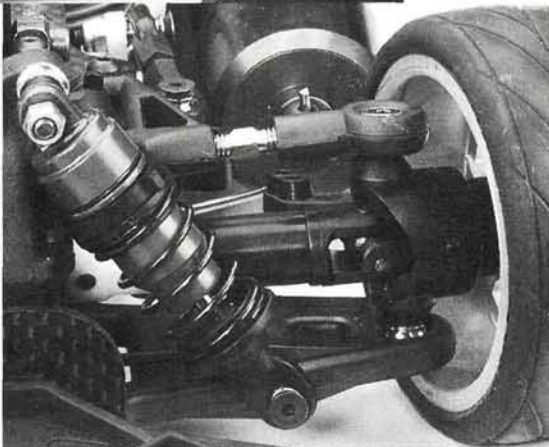
If you have an O.S. CV .12 (non-pull-start) engine with a regular crankshaft that you'd like to cut to fit the Pro, don't try it. Regular length O.S. crankshafts are not threaded all the way down to the crankshaft bearing, and if you cut the shaft, you'll have to install shims in front of the flywheel to tighten the clutch nut all the way down. And if you add these shims, you'll have spacing problems when you try to set the proper clutch-bell/spur-gear mesh. Your best bet is to order a short crankshaft from O.S. that is pre-cut and completely threaded. Its installation is easy because you do not have to remove the crankshaft bearings from the engine to install it.



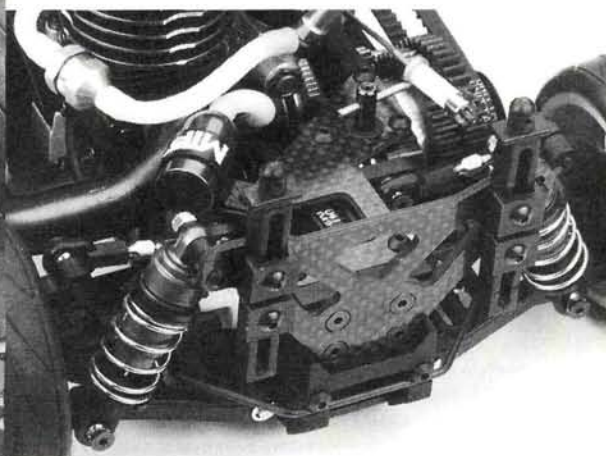


**Left: the Pro was designed to use a 5-cell hump-type receiver pack. I chose a Team Orion\* 1000mAh nickel-metal-hydrate pack because it provides long run times and doesn't suffer from the memory problems associated with Ni-Cd packs. I installed an Alien\* universal belt tensioner for the front belt, but it isn't really necessary (yet).**

**Right: for added versatility, the Pro's hard-anodized, Teflon-coated shocks come with shafts in two lengths. You'll also find titanium tie rods and hinge pins, universal sliders, which provide smooth power transfer, and a front swaybar that can be adjusted quickly and easily. Note the graphite hinge-pin brace and Pro-Line V-Race tires.**



**Above: the Pro's pillow-ball front suspension comprises upper and lower suspension arms and stout steering-knuckle arms. Caster and camber are easy to adjust, and if you add the included lower suspension-arm mounts and upper caster wedges, you'll have Reactive Caster or dive characteristics. Note the 6061-T6 aluminum hex hubs—very trick.**



**Above: you'll find hard-anodized shocks, titanium tie rods and hinge pins, universal sliders and an adjustable swaybar back here, too. The bulkhead and hub carriers have several camber-rod mounting locations that allow camber rise adjustment. Check out the graphite shock tower and adjustable body mounts—sweet.**

- Fully equipped with every amenity a racer could ask for.
  - Hex-drive machine screws used throughout (no self-tapping screws).
  - Centered fuel tank for consistent handling from start to finish.
  - Highly adjustable chassis.
  - Excellent instructions filled with tuning and driving tips.
  - One of the largest dealer networks in the industry (easy to find replacement parts).
  - Friendly, knowledgeable customer-service staff.

**Likes**
- Pull-start engine selection is quite limited.
  - The kit has a ton of fasteners that make stripping the car down to a rolling chassis time-consuming.

**dislikes**

## FINAL THOUGHTS

The Traxxas Nitro 4 Tec Pro just might be the most well equipped touring car I have ever tested. It's also the car that receives the most comments at the track: "That's a Traxxas?" and "Where can I get one?" are the most common responses. Even though the Pro is limited as far as pull-start engine choices are concerned and working on it can be a little more time-consuming than with some other cars, I have no problem recommending it to serious racers. Traxxas has plans to produce only 3000 Pro kits, and they will sell out fast, but if, for some reason, you miss out on the opportunity, any Nitro 4 Tec RTR can be converted into a Pro by ordering almost every available hop-up on the Traxxas optional parts list.

*\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.*

## THE COMPETITION

	Traxxas Nitro 4 Tec Pro	HPI Nitro RS4 Racer	OFNA Z10 Pro
Wheelbase	10.2 in. (259mm)	10.27 in. (261mm)	10.28 in. (261mm)
Width (F/R)	7.8 in. (198mm)	7.5/7.75 in. (191/197mm)	7.5 in. (191mm)
Weight	55 oz. (1,159g)	51 oz. (1,446g)	49.4 oz. (1,400g)
Diff Type	Ball	Bevel gear	Ball
Brakes	Graphite disk	Fiber disk	Graphite disk
Tune pipe	Not included	Not included	Not included
Available at*	\$330	\$217	\$325.99
Reviewed in	7/99	8/98	8/98

\*Prices vary with location







# Kyosho **Super Eight Landmax Superflo Ford F-150**

by Doug Huse

**T**o a lot of people, "off-road" is synonymous with "truck," and few trucks are as awesome in action as the racing thoroughbreds that conquer the Baja 1000 and other mega-mileage, treacherous-terrain-traversing events. If that's the sort of action you'd like to see captured in an R/C vehicle, Kyosho\* has just the rig you're looking for. The Super Eight Landmax Ford F-150 trophy

truck, replete with straight-from-the-track Superflo graphics, is an off-road version of the versatile, Inferno-based Landmax chassis that I've tested previously and grown fond of in rally-car trim. I can't wait to see how well it performs in truck mode!



PHOTOS BY WALTER SIDAS



# Flying Tiger





# KYOSHO LANDMAX F-150



## s p e c s

SCALE 1/8  
LIST PRICE \$599.99

**DIMENSIONS**  
Wheelbase 12.75 in. (324mm)  
Width (F/R) 10.04 in. (255mm)

**WEIGHT**  
Gross, RTR 115.14 oz. (3,264g)

**CHASSIS**  
Type Channeled plate  
Material Aluminum

**DRIVE TRAIN**  
Type Shaft  
Primary Clutch bell/spur  
Drive shafts Dogbones  
Differential(s) Bevel gear  
Clutch Centrifugal 2-shoe  
Bearings/bushings Both

**SUSPENSION (F/R)**  
Type Double A-arm w/adj. upper arms  
Damping Plastic oil-filled, coil-over shocks

**WHEELS**  
Type One-piece plastic

**TIRES**  
Type Molded scale-tread type

**POWERPLANT**  
Engine Kyosho GS-21R pull-starter  
Carb Slide type  
Pipe Tuned muffler

**RADAR CONFIRMED TOP SPEED\***  
38.7mph

\*Best speed achieved on level surface with stock gearing and tires, using 10% nitro fuel. Engine tuned for best all-around performance and longevity.

### NARROWED SUSPENSION

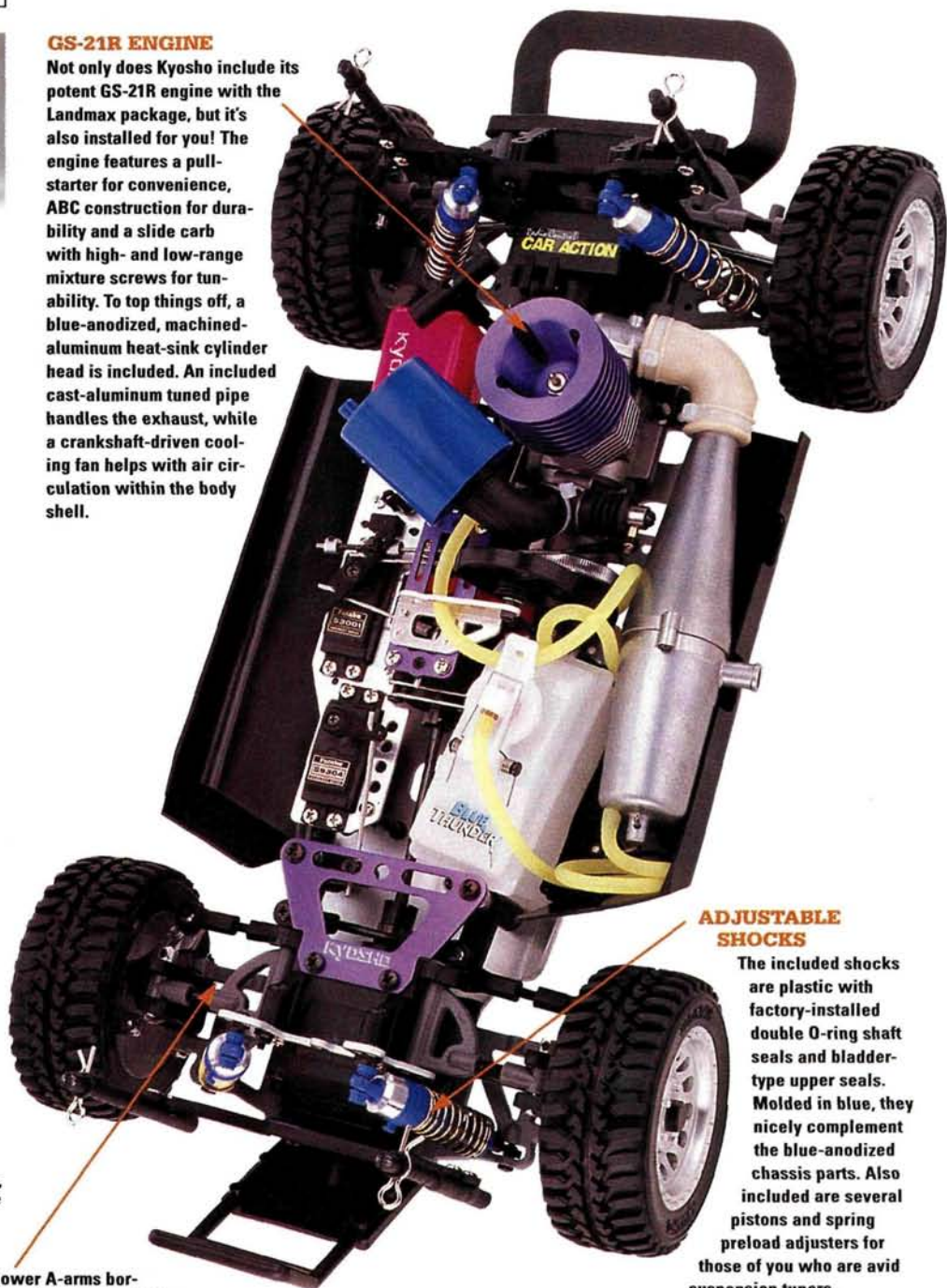
The front and rear suspensions consist of upper and lower A-arms borrowed from the GP-20 series of on-road cars, which are also narrowed, Inferno-based machines like the Landmax. The upper arms can be mounted in several positions for suspension tuning and feature threaded rods for camber adjustment. The lower arms feature ride-height-adjusting screws. The kit also includes three rear, lower-suspension pivot-mounting plates for setting 0, 1, or 2 degrees of rear toe-in. The front shock tower is made of stamped aluminum plate with three shock-mounting holes, while the rear is made of a flexible, yet very strong, composite plastic that allows five upper shock-mounting positions. The Landmax comes equipped with bellcrank steering with a built-in servo-saver and threaded rods for setting toe.

### 2.5MM ALUMINUM CHASSIS

The Landmax chassis is a 2.5mm-thick aluminum plate. The front and rear gearboxes, center diff, brakes and engine are factory installed. The rear gearbox features an added chassis brace to help reduce flex. The radio tray is also made from a stamped aluminum plate and can easily be removed for chassis cleanup. Kyosho has also included a receiver protector to keep dust away from your electronics. Plastic chassis side guards not only protect the tuned pipe, but they also help keep out some of the sand and debris kicked up by the front tires. Up front, the chassis is protected by a truck-type front skidplate and brush guard that is not only functional but also looks great!

### GS-21R ENGINE

Not only does Kyosho include its potent GS-21R engine with the Landmax package, but it's also installed for you! The engine features a pull-starter for convenience, ABC construction for durability and a slide carb with high- and low-range mixture screws for tunability. To top things off, a blue-anodized, machined-aluminum heat-sink cylinder head is included. An included cast-aluminum tuned pipe handles the exhaust, while a crankshaft-driven cooling fan helps with air circulation within the body shell.



### ADJUSTABLE SHOCKS

The included shocks are plastic with factory-installed double O-ring shaft seals and bladder-type upper seals. Molded in blue, they nicely complement the blue-anodized chassis parts. Also included are several pistons and spring preload adjusters for those of you who are avid suspension tuners.

### SCALE BODY AND WHEELS

If you're into scale cars and trucks as I am, you're going to love the Superflo Ford F-150 trophy truck body. Kyosho has turned out another excellent body and sticker set that are easily transformed into a scale masterpiece with just a little black paint. I did, however, add a few extra stripes of my own to liven up the mostly black paint scheme. The body is formed from thick, high-quality Lexan with great detail and easily recognizable trim lines. The wheels are about the coolest set I've seen; the rim portions have a polished chrome look, while the centers have a matte aluminum finish and lots of molded-in detail. A set of authentic-looking off-road radial truck tires completes the package.

### 3-DIFF DRIVELINE

The driveline is comprised of a shaft-driven, four-wheel-drive system with ball-bearing-supported outdrives on all three gear differentials. The pinion shafts on the front and rear gearboxes are also bearing supported, making a total of 10 ball bearings included with the kit. The center diff mount also carries the independently adjustable, cam-operated metal calipers and plastic brake disks. Power is sent to the wheels via front and rear dogbones driving bushing-supported axle shafts.

## TEST GEAR

• Futaba\* 3PDF transmitter • Futaba R13if receiver • Futaba S9304 steering servo • Futaba S3001 throttle/brake servo • Dynamite\* 5-cell receiver battery • Dynamite Blue Thunder 10-percent fuel



A new, two-piece, cast, tuned pipe is stock equipment with the Superflo truck. The powerful Kyosho GS-21R engine with pull-starter is also standard equipment and is fed by a 125cc tank (for long run times) and cooled by an on-board fan unit.

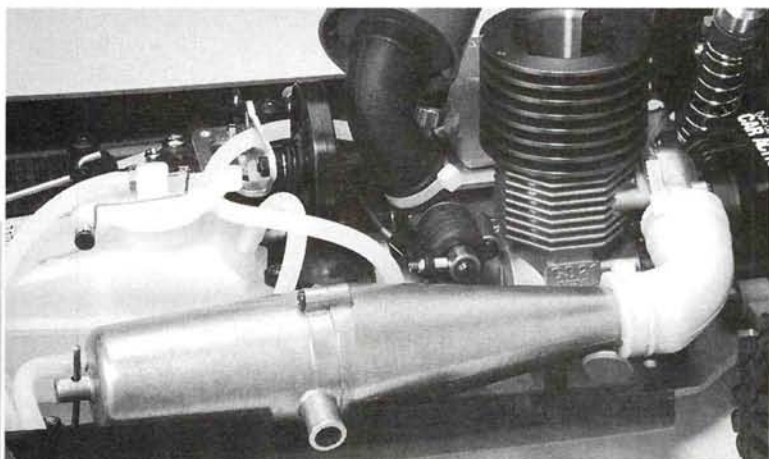
Cast steering knuckles house bronze axle bushings. Notice the knuckle carrier; there are two mounts for the upper pivot, but only the lower one is used. Cut off the upper mount to allow body clearance.



## PERFORMANCE

After a few tugs of the starter, the engine came right to life. Be sure to follow the break-in instructions carefully to ensure a long and healthy life for your engine. OK, so how did the Landmax do? All I can say is that it's a beast of a truck! It's fast, it handles well and it likes to be driven aggressively. If it starts to get away from you, just let up a bit on the throttle; it will usually collect itself.

I expected the narrow Landmax platform to be a bit unstable in solid landings off larger jumps, but the truck surprised me with its surefootedness. Even sketchy off-camber touchdowns were dutifully swallowed up by the supple suspension, and the truck's midair manners were forgiving. The GS-21R engine chugged along reliably, and its fat powerband made it easy to churn through the soft sand where we shot the action photos. Once the engine had been fully broken in, I moved to the pavement for some high-speed passes as senior



## BUILDING & SETUP TIPS

In my opinion, the most important factors in successfully building an R/C car or truck are first, to thoroughly read the instructions to familiarize yourself with the kit, and next, to take your time and do it right the first time. Finally, use the proper tools for the job. Get some nice new no. 1 and no. 2 Phillips screwdrivers. Assembly will be a lot easier, and the screws won't get mangled due to worn tools that slip and strip.

■ Even though the engine comes installed on the chassis, remove the screws one at a time and apply Loctite\* to them. By doing this one screw at a time, you won't upset the preset gear backlash.

■ Speaking of Loctite: use it everywhere a screw goes into a metal part or non-locking nut. Without it, the screws will eventually vibrate loose.

■ If possible, get yourself an in-line fuel filter for the engine. As I've said before, it's just as important as the air filter.

■ Step 6. Be sure to double-check the instructions before you cut the front hub carriers; cutting the wrong side will really ruin your day!

■ Step 10. Make sure that the fan is facing in the correct direction before you glue the pulley.

■ Step 11. Use some Team Associated\* Green Slime on the shock shafts during assembly. The Kyosho O-rings are a bit tight, and the shafts can stick without it.

■ Steps 14 and 15. Install the shock on the arm first, and you won't have to fight the spring when you try to line up the mount.

■ Step 24. For double protection against losing the receiver, stick it to the radio tray with servo tape before securing it with the included tie strap.

■ Step 33. Be sure to remove the plating from the areas where the tires will be glued to the wheels.

**The Superflo uses the same suspension components as all the other Landmax vehicles. The suspension is damped by coil-over, oil-filled shocks. The shocks are mounted on plastic shock towers that offer several placement options.**

- Excellent body detail and high-quality graphics.
- Partial assembly reduces building time.
- Go-anywhere design—great for bashing on any terrain.
- Rear bumper makes a nice carrying handle.
- Inferno-based chassis is very durable.



Likes

- Bushings used for drive axles.
- O-ring drive for cooling fan breaks easily.
- Plating on wheels covers tire bonding area and must be removed before gluing tires.
- Chrome finish on wheels chips easily.



dislikes

## YOU'LL NEED

- 2-channel radio system.
- Receiver battery.
- Steering and throttle servos (60+ oz.-in. torque recommended).
- R/C car fuel.
- Glow igniter.
- CA glue.

## FACTORY OPTIONS

- Universal swingshaft—part no. GTW-1.
- Special tie rod—GTW-2.
- Special upper rod—GTW-3.
- High-grip tires—GTW-4.
- Carbon body stay (F/R)—GTW-7/GTW-9.
- Carbon front shock stay—GTW-8.
- Big Pressure shocks (F/R)—IFW-30/IFW-31.
- Stabilizer set (F/R)—BSW-79/BS-63.
- Special brake disk—BSW-52.
- Special radio posts—BSW-54.
- Special unicrank—BSW-86.
- Special antenna holder—1710.
- Fuel filter—1876.
- Bearing—BS-0/6.

editor Steve Pond shot some radar beams at it. With a best speed of 38.7mph, the big truck is quick!

The only shortcomings I found were with the plastic brake disks. The front disk started to show some wear after only a few runs. It really needs to be of a heavy-duty fiber type although plastic would still be fine for the rear. My other complaint with the truck is that Kyosho included bushings for the axles instead of ball bearings.

## FINAL THOUGHTS

The Landmax is one of those R/C vehicles that just makes you smile from ear to ear the entire time you're driving it. If you're tired of looking for that perfect piece of pavement or patch of dirt, then look to the Super Eight Landmax for pure, white-knuckle, go-anywhere action!

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.





# NEO **Attack** **MX4**

by Greg Vogel



PHOTOS BY WALTER SIDAS

# ROAD WARRIOR



# s p e c s

## SPECIFICATIONS

SCALE 1/10  
LIST PRICE \$524  
STREET PRICE \$399

**DIMENSIONS** (chassis only)  
Length overall 15.87 in.  
(403.1mm)  
Wheelbase 10.77 in. (274mm)  
Width (F/R) 8.94/9.58 in.  
(227/243.4mm)

**WEIGHT**  
Gross, RTR 77.7 oz.  
(2,202.7g)

## CHASSIS

Type Double-deck plate  
Material Aluminum

## DRIVE TRAIN

Type 4WD belt  
Primary 2-speed  
Transmission (F/R) Solid shaft with  
one-ways/solid  
shaft  
Axle type Dogbone  
Bearings/bushings Bearings

## SUSPENSION (F/R)

Type Double wishbone  
Damping Oil-filled, coil-over  
shocks

## WHEELS

Type Quick-change rims

## TIRES

Type Foam

## POWERPLANT

Engine Force .15  
Carb Slide  
Pipe Not included



**Y**ank the trigger and watch all four wheels grip. Hear the 2-speed kick in and the engine get on the pipe. Slam on the double disk brakes and watch the Lola look-alike blast through the corners. Sounds exciting, right?—like maybe your adrenaline is already pumpin’?

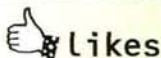
Those of you who are unfamiliar with the world of gas on-road racing should know that these land rockets move incredibly fast and stick to the ground like glue. They represent the ultimate radio-control driving experience. Distributed in the U.S. by Calandra Racing Concepts\* (CRC) and in Canada by Golden Horizon\*, NEO reveals its latest entry in the ever-evolving world of 1/10 on-road nitro with the Attack MX4.

Let’s see whether this new competitor has what it takes to challenge other ultimate race machines from established A-main contenders such as Serpent and Picco.





- Rigid chassis.
- Adjustable centrifugal 2-speed tranny.
- Highly tunable suspension.
- Power clutch.
- Quick-change wheels.



- Stock rear wheels hit the hubs.
- Drag in the drive train (until it had been fully broken in).
- My kit came with an engine, so where are the pipe and manifold?
- Instructions are a little confusing.



## ON DECK

The aluminum upper deck contains many of the Attack's vital components. The vertically mounted servo is bolted onto the plate up front and is connected to the steering knuckles via adjustable tie-rod linkages. On the right-hand side of the car, the receiver is in a casing that protects it from fuel spills. The throttle servo is toward the back. Wire linkages allow slide-carburetor hook-up. The battery is on the opposite side, and a 75cc fuel tank with flip-top lid and inner fuel filter is in the center.

## SOLID AXLE AND ONE-WAY DRIVES

Most of us are accustomed to seeing some type of differential in a car, but the MX4 has neither a front nor a rear differential. The rear end uses a solid axle to which the pulley gear is directly pinned. The front is driven by a similar solid axle, but a one-way bearing has been installed in each outdrive, and a dogbone drives each stub axle. The entire drive system rides on large-diameter ball bearings.

The triple belt drive uses two short belts—one front and one rear—with a long, center drive belt. Two pulleys (22- and 23-tooth) are included to adjust the front drive ratio.

## DOUBLE DISK BRAKES

With a .15 engine and 2-speed transmission strapped to a lightweight chassis, you'd better have some heavy-duty stopping power. To handle the braking duties, the Attack employs two stainless-steel vented disks and three fiber pads.

## QUICK-CHANGE WHEELS

Perhaps one of the coolest features on any 1/10- or 1/8-scale nitro on-road car is the quick-change wheel system. Inside the stub axle is a simple spring-and-hook assembly. Pull back on the hook tab to pull the wheel off, then push and turn the wheel to put it back on. This makes it much faster and easier to change a tire during a race and eliminates the chance of having cross-threaded or misplaced wheel nuts.

## FULLY ADJUSTABLE SUSPENSION

The MX4 uses a double-wishbone-type suspension in the front and rear. Stout steering knuckles pivot on large pillow balls at the end of the front arms. You can adjust camber or track by threading these balls in and out. The rear uses a slightly different setup. The same large pivot balls are at the bottom of the arm, and a solid ball link and upper-arm unit are on top. You can adjust rear camber and toe by adjusting the lower balls.

Swaybars are provided front and rear. The flattened lever-arm extensions on the swaybars are unique because they can be adjusted to firm or soft settings, depending on the orientation of the flats. For instance, if you install the extensions with the flat side horizontal, the swaybar will feel soft; a vertical position will make it firm.

## YOU'LL NEED

- 2-channel FM radio with two good-quality servos.
- Receiver pack.
- Starter box.
- Glow starter.
- Fuel.
- Pipe and manifold.
- Body.
- Spare tires.

## 4MM MACHINED-ALUMINUM CHASSIS

If you're going to hit speeds in excess of 60mph, you had better have a solid platform. The MX4's foundation is a 4mm-thick aluminum plate with countersunk screw holes and engine slots. The chassis also features beveled edges and relieved areas to reduce weight.

## TEST GEAR

- Airtronics\* M8 • Airtronics 94157 steering and 94242 throttle • NEO pipe and manifold • O'Donnell\* 20-percent-nitro fuel • Dynamite\* battery • Dynamite starter box



# PERFORMANCE

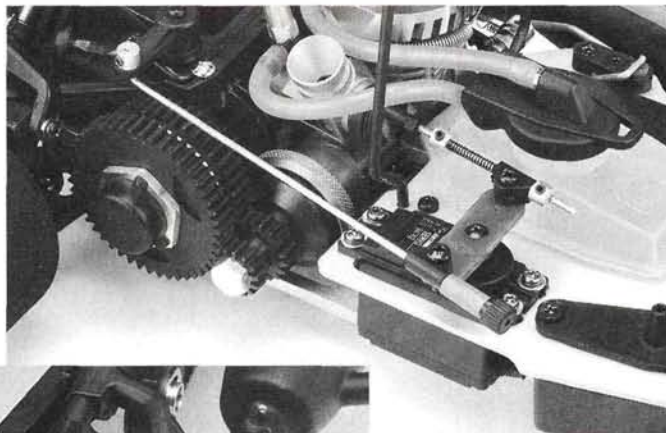
After all the prep work I had done to make the Attack run competitively, I was eager to see how well it would hook up. When it took off from the line, the car was instantly glued to the track. The Force engine, however, didn't exhibit much low-end power, and this was unfortunate because the car can handle a whole lot of power.

I opened up the throttle on the straight, and the second gear kicked in. Let's just say the car really moves; before I knew it, I had to back off the throttle and set up for the corner. This, in my opinion, is where the fun really starts with these vicious on-road machines. As I let off at the end of the straight, the MX4 scrubbed off a little speed and I came right back on the throttle, pitching it slightly side ways through the corner while maintaining control by manipulating the throttle. Lap after lap, I executed the same moves; the MX4 is very consistent. I could slide its rear around at every corner, and its nose came to within an inch or two of the retaining boards. Although the car was manageable, the sliding did add a few seconds to my lap times. A tire swap was definitely in order to lock in the rear.

After half an hour of continuous running, the MX4's power clutch had loosened, and I had to pull it off the track. At the time, I didn't mind; I needed to calm down after my intense driving experience. The power-clutch nut had mysteriously backed off, but the clutch itself was still in good shape. I put a drop of Loctite\* on the threads so it wouldn't happen again.

At this point, I realized I had already gone through my first set of tires. The stock soft compound hooked up very well,

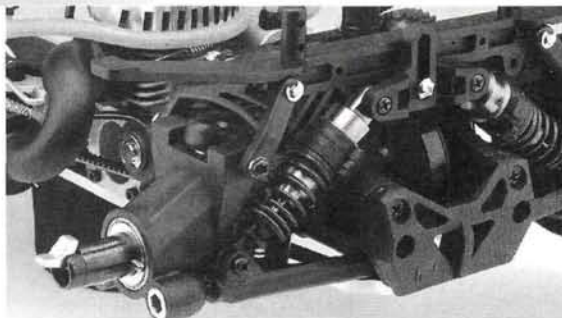
but for my next run, I snapped 40s on the front and 35s on the rear and hoped these would last a little longer. Tires are perhaps the only downside to this form of racing; during a race day, you'll go through several pairs—kinda puts a hurt on your wallet, but the driving experience is well worth it.



**Above: a 2-speed is a trick part for any car, and the Attack's 2-speed is stock with an adjustable, 2-shoe centrifugal clutch. The engine is fitted with a power clutch unit that has several ball bearings that push against the clutch plate into the clutch bell.**



**Above: camber, caster, track, toe, droop: the list goes on. The Attack's suspension is fully adjustable. Huge bearings support each axle, and inside the large-diameter axle is a spring-loaded clip that allows quick wheel changes.**



**Above: you can see the floating body mounts better from the back. The mounts are linked to the hubs so that all the downforce is directed to the wheels and not to the chassis, as on 1/10 pan cars.**

# THE WRAP-UP

The NEO Attack MX4 is definitely an adrenaline-pumping driving experience. You must be an excellent driver and mechanic to successfully set up and drive one of these ultimate machines. Sorry, beginners; this car is not for you. However, if you are an experienced racer who is looking for a new challenge to test your skills, you might want to pick up an Attack. This car is a definite competitor in the world of elite, 1/10 on-road 4WD racers.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.

# BUILDING & SETUP TIPS

Building the Attack isn't easy. Extra time and care are needed to build components such as the brakes and pivots. Here are some problems and solutions:

■ First, I encountered clearance problems with the stock rear wheels. The insides of the rims rubbed the rear hubs, so I bolted the wheels to my Hudy tire truer and trimmed off about 1/8 inch.

■ My second concern was the tightness of the drive; the new belts and packed bearings required a lot of effort to roll, so I carefully sprayed a little WD-40 onto the belts to soften them.

■ When you install the servo and servo-saver, take your time. The instructions were a little confusing, so I pushed them aside and installed the components by trial and error. The servo is mounted with the ears on top of the plate; the screws go up through the bottom. The ball studs for the steering linkage go on the bottom of the servo-saver.

■ Two roll pins need to be tapped into the chassis. Make sure that they are flush with the chassis' bottom.

■ When you install the bearings, push them into the plastic with a socket wrench that's about the same size as the bearings' outer diameter. To properly seat the bearings, you may want to tap the socket with a small hammer.

■ If you use the Force engine that comes with the kit, you should disassemble and seal it before you install it in the car. My engine had a small air leak, and that made it difficult to tune.

■ Decking the engine mounts. When the mounts have been installed on the engine, place a piece of 250-grit sandpaper on a flat surface and run the engine mounts across it. If the anodizing comes off only in certain areas, the mounts are not level and won't seat properly. This means the gearing won't align and might cause the engine to lose rpm. Keep making passes with the sandpaper until the mounts are flat.

■ The final rough spot in assembling the kit was body selection; I had ordered a Serpent\* Porsche body for the car because I wanted it to look good. Unfortunately, it didn't fit the car well, so I picked up a Parma\* Lola and painted it with Parma's Faskolor water-based paints.

# SETUP INFO

I gave CRC a call to find out how they set up the car; here's what they run.

## FRONT

Shocks  
Piston—single hole  
Oil—80 or 100WT  
Spring—1.8mm  
Droop—up 2mm  
Camber of droop—2 degrees  
Ride camber—2 degrees  
Toe-out—1 degree  
Swaybar—45 degrees

## REAR

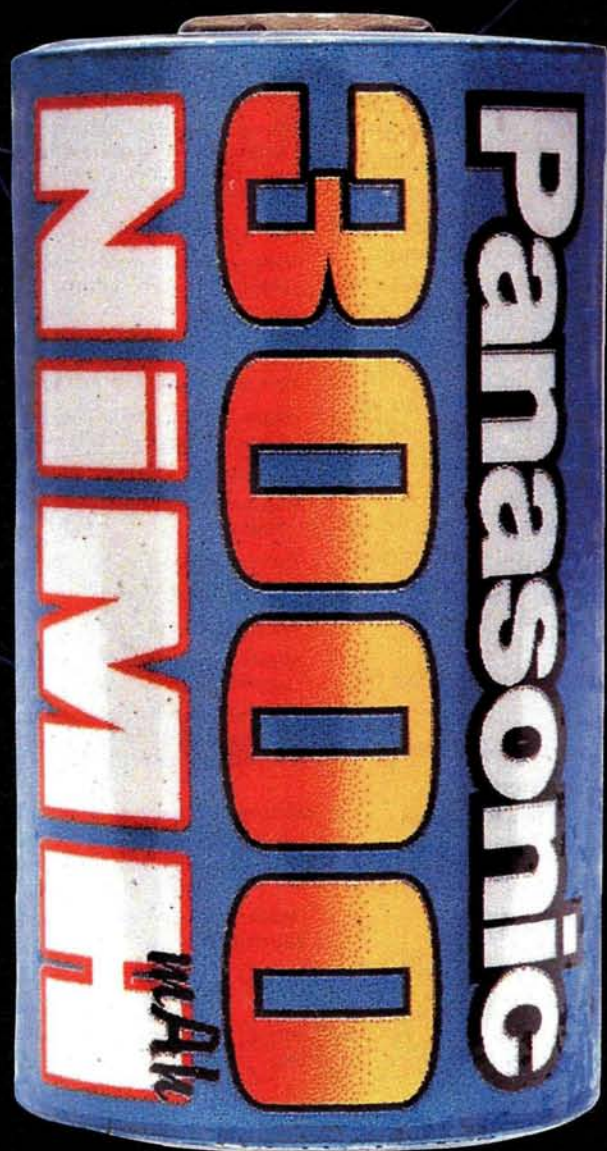
Shocks  
Piston—two-hole  
Oil—50WT  
Spring rate—1.4  
Droop—6mm  
Camber—1 to -2 degrees  
Swaybar—2.5 bar



EXCLUSIVE

# Trinity's Panasonic 3000 Ni-MH Cells

by Steve Pond



**T**he technology behind rechargeable batteries is primarily responsible for making R/C what it is today. Sure,

there were gas-powered cars for years before Ni-Cd batteries were introduced, but at that time, they were very unreliable, complicated

## WELCOME TO

and frustrating. The introduction of the Ni-Cd battery shifted the industry into overdrive; electric-powered cars were less expensive, simple and very reliable.

Since those days, we've seen many technological advances, both in the cars we drive and in the batteries we use to power them. We started with temperamental 1200mAh Ni-Cd cells, and gradually advanced right up to today's more stable and more powerful 2000mAh cells. Well, just when you might have thought that the final battery-capacity frontier had already been reached, the largest single capacity increase in the history of R/C batteries is about to come your way.



Trinity\* has agreed with Panasonic to be the exclusive distributor of Panasonic's new 3000mAh Ni-MH (nickel metal-hydride) cells. They're the first sub-C Ni-MH cells developed specifically for the rigorous demands of R/C vehicles.

Panasonic has been manufacturing rechargeable batteries for quite some time, but Sanyo always seemed to be one step ahead in Ni-Cd technology. At the beginning of 1997, however, Panasonic's parent company, Matsushita, changed its focus and entered a multimillion-dollar alliance with the Toyota Motor Co. to develop Ni-MH batteries for full-size electric vehicles (EVs). Though this had no direct relationship to R/C, the demands made of the batteries used in full-size EVs are very similar to those made of R/C batteries; they're only bigger. In some form, the technological leap that led to the development of the batteries used in EVs must have benefited the new batteries that Panasonic has developed specifically for R/C.

Ni-MH batteries are not new; in fact, they have been around for a few years, providing power for cellular phones, portable computers and other battery-powered appliances. These applications require far less in the way of current delivery and fast-charge potential. Their batteries require relatively conservative charge rates and have so much internal resistance that a discharge that resulted from a 10-minute conversation on a cell phone would heat the batteries enough to make your ear feel as if it was being cooked! Having trouble handling even

least 50 percent longer to charge. For the Ni-MH cells, average charge times are in the 3,900- to 4,000-second (65- to 66.6-minute) range, compared with an average of 2700 to 2900 seconds (45 to 48 minutes) for 2000mAh Ni-Cds at the same charge rate.

After this long, "toe-tapping" charging session, the Turbo Matcher 4 eventually reached its re-peak stage and clicked into discharge. The results were staggering—an average of 364 seconds discharge time at 30 amps; in my astonishment, "Holy \$#!%" was all that I could muster. I should really have expected it, but at the back of my mind, I was thinking, "Yeah right; another super battery." Now, thoughts of 6-turn motors and 7-minute races begin to flash through my mind.

Other averages provided by the Turbo Matcher:

- average voltage—1.101;
- internal resistance—28 (Relative Internal Resistance);
- milliwatt hours—3378.

Compared with those of current 2000mAh matched cells, these numbers are obviously staggering. Current 2000mAh Ni-Cd matched cells produce about 265 seconds of run time at 30 amps with an internal resistance of about 26 milliohms. Their average voltage level is around 1.125 volts, and milliwatt hours average about 2240.

On the surface, it looks as if the Ni-MH cells have a voltage disadvantage, but when I printed the discharge graph, it showed quite the opposite. The Ni-

# THE YEAR 3000

mild discharge rates, they're hardly capable of withstanding the high charge and discharge rates demanded by R/C cars.

The new technology from Panasonic appears to have the rest of the industry scrambling to catch up. An industry insider even admits to being years behind Panasonic in the development of Ni-MH batteries. So what does this mean to us? *R/C Car Action* was given an exclusive opportunity to put a few of these new batteries through the proverbial grinder to see what Panasonic claims is true. Can they really take the abuse to which we so freely subject batteries?

## CHARGED UP FOR TRUTH-TELLIN'

I took the sample cells straight to my fresh-out-of-the-box Turbo Matcher 4—a battery matcher used by many of the industry's top battery companies, including Trinity.

My first surprise—though I should have expected it—was that it took more than an hour to charge the cells. At first, I thought this was an unusually long time, but I quickly realized that a battery that has a 50-percent-higher capacity is bound to take at

MH cells' discharge characteristics don't match the high starting voltage of the Ni-Cd cells, but they do show that they can maintain a higher, more consistent voltage throughout the discharge cycle (refer to

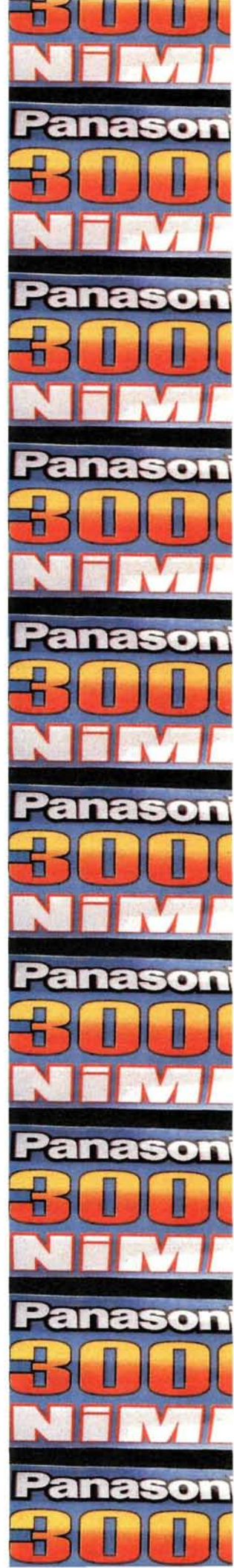
graph on next page).

The Ni-Cds start with a very high voltage output of approximately 1.3 volts per cell, but after 20 to 30 seconds, this falls to about 1.1 volts per cell, at which point it levels off. The rest of the Ni-Cd cells' cycle shows a more gradual voltage drop until it reaches about

1 volt; then it goes into "dump" mode. The Ni-MH cells, on the other hand, start at a more conservative 1.18 to 1.2 volts and maintain a much more consistent voltage level throughout the discharge cycle; in fact, throughout most of the discharge cycle, they maintain a higher voltage level than the Ni-Cds. The Ni-Cds' average voltage appears to be skewed by their higher initial voltage during the first 30 seconds of the cycle. What does this mean? First, you won't have the Ni-Cds' typical initial blast of power that fades after a short time. The Ni-MH cells will deliver power more consistently throughout a run.

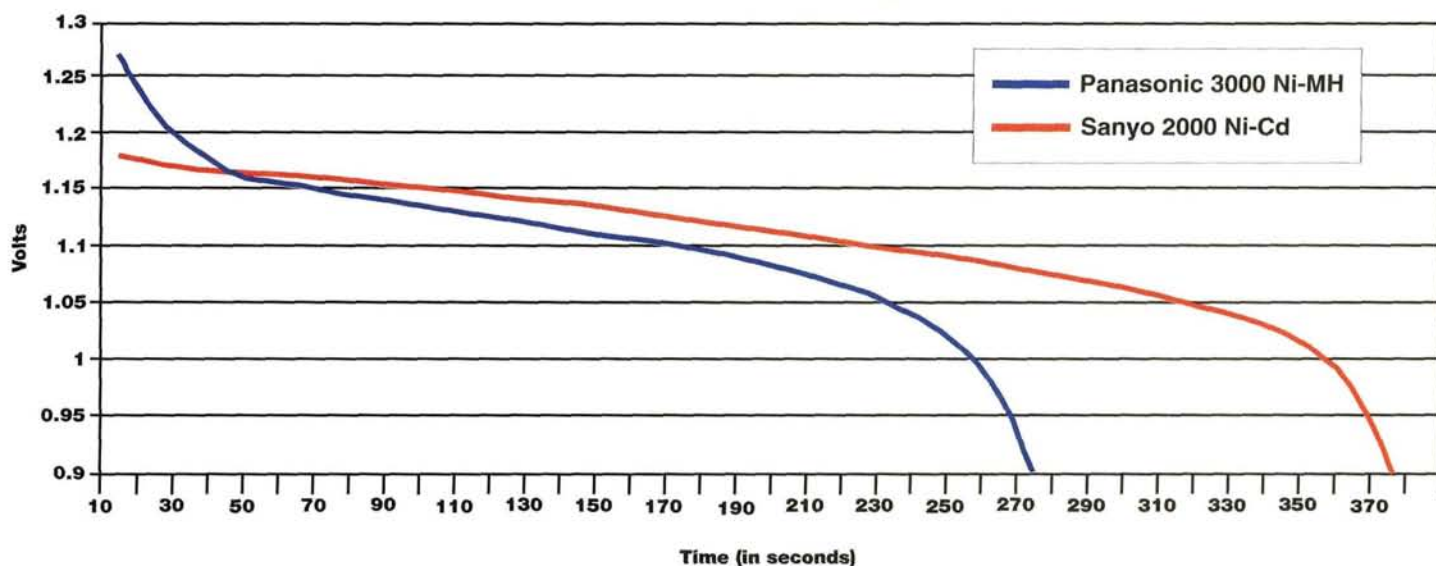


**In addition to the Ni-MH cells, Trinity will offer new 1400mAh packs using Panasonic SCR Ni-Cd cells.**





## 30 amp discharge



## DISCHARGING OVER THE LONG HAUL?

How will the Ni-MH cells stand up to high rates of discharge over the course of a racing season? It might be some time before we are able to determine the longevity of these new cells, but during the 10 days I had them (secrecy dictated that I had to ship them straight back to Panasonic), I was invited to torture them as I pleased. Uhhmm ... OK!

I averaged about three cycles a day for 10 days. Some discharges were at 20 amps, but most were at 30. For the first three days, I dead-shorted the cells between cycles—something Trinity later told me isn't recommend.

For the rest of my tests, I left the cells alone after discharging them, and that seemed to have a leveling effect on their

## SPECIFICATIONS

	Sanyo 2000 Ni-Cd	Panasonic 3000 Ni-MH
Length (casing) .....	1.63 in. (41.6mm)*	1.63 in. (41.6mm)*
Length (overall) .....	1.67 in. (42.4mm)	1.675 in. (42.5mm)
Diameter .....	0.87 in. (22mm)*	0.87 in. (22mm)*
Internal resistance (20A/30A) .....	.20/.26 RIR**	.21.5/.28 RIR
Milliwatt hr. (20A/30A) .....	.2347/2228	.3372/3286
Ave. voltage (20A/30A) .....	1.152/1.113	1.143/1.106
Ave. charge time @ 4 amps (sec.) .....	.2760	.3982
Ave. discharge time (sec.) (20A/30A) .....	.378/271	.546/364
List price (6-cell pack) .....	\$.75 to \$139	\$.85 to \$119

\*Add 0.020 inch (0.5mm) to all dimensions for factory shrink-wrap.

\*\*RIR = Relative Internal Resistance

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## TRINITY CELLS

run times. I managed to knock their average discharge time down to 357 seconds at 30 amps, but much of that may have been the result of dead-shorting them. My tests proved one telling fact: there isn't a noticeable change in performance when you subject the batteries to many cycles in the same day: despite repeated back-to-back cycles—a practice that Ni-Cd cells don't like very much—they maintained voltage, resistance and run time.

About the only courtesy I extended to the Ni-MH cells was that I allowed them to cool to room temperature before I ran them again.

Will these cells fit existing battery slots? They match the 2000mAh Ni-Cds in all but one dimension: overall length; they're larger by 0.005 inch—about the thickness of two hairs. So, yes they will fit any car that can use 2000 Ni-Cds.

### WHAT'S THE BOTTOM LINE?

After my admittedly limited tests of the new Panasonic 3000mAh Ni-MH cells, my conclusion is that they'll open some doors for R/C electric enthusiasts. They average 100 seconds more run time at a 30A discharge rate than the current 2000mAh Ni-Cds. This will allow longer

run times, or the use of hotter motors, or a combination of both.

Trinity expects to be able to offer a full line of these batteries, ranging from un-matched assembled stick packs right up to VIS Ex-Tra matched Team Spec packs that will range in run times from 365 to 370 seconds at a 30A discharge rate. Their list prices will range from \$85 to \$119—the same price as the current Ni-Cds!

The new Panasonic cells are not legal for sanctioned racing, and if history offers any indication, it will be a little while before you see these things on a racetrack—at least in sanctioned competitions. They will be available, though, and many won't care about racing with them. Among those who are concerned about it, these cells are sure to spark a heated debate.

We certainly need more time to establish the new cells' level of durability and charge characteristics, but if my test results over a 10-day period are any indication of what we can expect over the long haul, then we're in for a whole lot more fun!

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■

## Piggyback

### EDC Reservoir Shocks & Reservoir Kits

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in six  
different colors!

**Piggyback Reservoirs** are machined from 6061-T6 aluminum, polished and anodized in six great colors. Featuring a unique closed cell foam insert for volume compensation, these reservoirs increase oil capacity and eliminate oil aeration. This results in more consistent performance during long races and fewer rebuilds.

**Piggyback Reservoir Kits** are available to upgrade Progressive Suspension EDC shocks and stock Associated™ Shocks.

**EDC-2 Shock Kits** complete four position damping adjustable shocks including Piggyback Reservoirs. Suggested retail. 76.50 pr.

See table for applications.

Piggyback Reservoir Kits			
PBR-1001	..... Set of 2 .....	SRP	\$32.50
PBR-1002	..... Set of 4 .....	SRP	\$62.50
EDC-2 Piggyback Reservoir Shocks			
EDC-2001	4" ..... Associated™	SRP	\$76.50 pr.
EDC-2002	3.75" ..... Associated™	SRP	\$76.50 pr.
EDC-2003	3.5" ..... Associated™	SRP	\$76.50 pr.
EDC-2004	3" ..... Associated™	SRP	\$76.50 pr.
EDC-2010	4" ..... Losi™	SRP	\$76.50 pr.
EDC-2011	3.5" ..... Losi™	SRP	\$76.50 pr.
EDC-2012	3" ..... Losi™	SRP	\$76.50 pr.

Please indicate reservoir color choice when ordering.

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**Progressive  
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# PACK CONDITIONIT

## POWER PLAYERS

Is it just us, or have any of you felt that the level of technology used to discharge your packs is just a little out of whack compared with the technology used to charge them? "Yep, when I cycle packs I use this big-dollar computerized gizmo to juice up my cells, and I dump the packs on these, uh, light bulbs." We have nothing against those good ol' 1157 taillight bulbs, but there are (literally) smarter ways to discharge and cycle a pack. This guide covers the latest computerized battery-conditioning systems, which we define as micro-processor-controlled chargers with a built-in discharger and cycle function or satellite dischargers that can be linked to the charger.

The brands are listed in alphabetical order, so position does not indicate rank, but we do rate the chargers in the comparison chart. Charge!



### Apex Infinity

You'll never misplace this charger, given its screaming yellow case. The Infinity features a dot-matrix display and eight keys to cycle through the various screens and enter data. During a charge or discharge cycle, the Infinity's screen shows the charger's output in volts and amps, the input voltage and the charge/discharge time in seconds. The adjustable settings may be altered while charging or discharging. The Infinity can be set to cycle a pack up to 99 times, and the voltage cutoff is completely adjustable in  $\frac{1}{10}$ -volt (V) increments. Memory locations allow the charge and discharge capacities of as many as five packs to be stored for reference. The instructions make it simple to navigate through the screens, but no tips are included on how to use the charger or what, precisely, each function does. If you've had experience with other competition-type chargers, you shouldn't have any trouble, but if this is your first upgrade from a timed charger or a simple peak charger, you will be confused.

#### ADJUSTABLE PARAMETERS

- LCD screen contrast.
- Charge amperage.
- Discharge amperage.
- Discharge cutoff voltage.
- Number of charge/discharge cycles.

#### AT A GLANCE

- DC only.
- 1 to 7 cells.
- 5-amp (A) maximum charge rate.
- 5A maximum discharge rate.
- Retail \$230.

#### WHAT'S HOT

- Adjustable screen contrast.
- Built-in cooling fan.

#### WHAT'S NOT

- Maximum charge/discharge amperage is low.
- Buttons must be pressed very deliberately to function properly.
- Instructions are cursory at best.

### Competition Electronics Turbo 35



This is a true racer's charger; it has plenty of features to fully exploit the potential of your best packs. In addition to charging, discharging and cycling packs, the Turbo 35 can run a motor for break-in or power a lathe. A 10-minute "lockout" time can be programmed into the unit during which it will ignore any voltage drop as the pack charges; this is very useful when charging older packs that have a bad tendency to false-peak. "Turboflex" is another charging option; this is Competition



# IONER GUIDE

by Staff

## ADJUSTABLE PARAMETERS

- Charge amperage.
- Discharge amperage.
- Cutoff temperature (when using temperature sensor).
- Number of charge/discharge cycles.
- Discharge cutoff voltage.
- Milliamp hour target setting.
- Pack voltage target setting.
- Charge timer.

## AT A GLANCE

- DC only.
- 1 to 7 cells.
- 9.9A maximum charge rate.
- 20A maximum discharge rate.
- Retail \$495.

## WHAT'S HOT

- Compact.
- Built-in fan.
- High-amp discharge capability.

## WHAT'S NOT

- VIS charging is a mystery feature.
- Instructions could be clearer.

GM's new, full-feature competition charger offers a temperature-sensing peak mode (when using the optional temp sensor), and it also offers the well-known VIS (voltage increasing system) charge mode as well as standard, linear charging. GM is tight-lipped about what the VIS actually is, but claims it will increase voltage without decreasing run time or harming the cells, and says it is not a type of reverse pulse charge. Look for a complete review of the charger next month for the full scoop!

Although the Commander's peak-detection circuitry is very reliable, user-programmable fail-safes are included to further safeguard against over-charging. The unit will stop charging once a programmed milliamp hour target figure has been reached, or a target pack voltage setting may be used to cut off charging. If you plan to be away from the bench but need to have a pack freshly peaked while you're gone, a timer function can be set to activate the charger in any mode after a delay of 1 to 99 minutes. Discharging is straightforward, and the discharge cutoff voltage is completely adjustable. Pack voltage and capacity are displayed after discharging. The Commander's cycling function allows up to nine charge/discharge cycles and uses whatever charge and discharge settings were last input. While cycling, the Commander displays how many cycles are left in the series, whether the pack is charging, discharging, or paused (the unit gives the pack a rest between cycles), amperage, voltage and capacity.



## GM Commander

age and capacity are displayed after discharging. The Commander's cycling function allows up to nine charge/discharge cycles and uses whatever charge and discharge settings were last input. While cycling, the Commander displays how many cycles are left in the series, whether the pack is charging, discharging, or paused (the unit gives the pack a rest between cycles), amperage, voltage and capacity.

Electronics' spin on reverse pulse charging, and the Turbo 35 offers nine "intensity" settings for the feature. The unit's discharge mode features user-settable voltage cutoff and displays milliwatt hours, milliamp hours, discharge time and average pack voltage. In addition to "straight" discharging with a constant load, the Turbo 35 offers "road-simulated discharge" that mimics the conditions encountered during a race. "Oval" or "off-road" may be selected, and Competition Electronics recommends that the road-simulated discharge mode be used for conditioning only. After charging, discharging, or cycling, the Turbo 35 provides comprehensive data including peak voltage, relative internal resistance and actual internal resistance, in addition to the discharge data noted above. For the ultimate in data storage, the Turbo 35 can be linked to a PC via the RS-232 serial port.

## ADJUSTABLE PARAMETERS

- Number of re-peaks on a single charge (1 to 3).
- "Turboflex" intensity.
- Charge amperage.
- Discharge cutoff voltage.
- Number of charge/discharge cycles.
- Motor voltage and run time (for motor break-in function).
- "Lockout" duration.
- Peak threshold.
- Time delay between re-peaks.

## AT A GLANCE

- DC only.
- 1 to 7 cells.
- 12A maximum charge rate.
- 35A maximum discharge rate (6-cell).
- Retail \$569.95.

## WHAT'S HOT

- Top quality, feature packed, highly adjustable.
- Includes motor-break-in function.

## WHAT'S NOT

- You wanna play, you gotta pay ... and this thing ain't cheap.



## INDI 16X2-Pro

This simple and inexpensive unit will suit the needs of most racers. An LCD display shows charge/discharge amperage, pack voltage and predicted run time in seconds at a 20 to 25A load; a three-position switch selects which value is shown. Charge amperage is set via a dial on the unit's face, and discharge amperage is set at 4 amps. A single button is depressed to select one of four charge, discharge, or cycling modes; press the button once for the first mode, twice for the second and so on. The first mode is "voltage embedded super charging" (VESC) that charges the pack at the selected amperage for about 10 minutes, goes to trickle-charge for 2 minutes, then resumes charging at the selected amperage until the pack peaks. Mode 2 is "fuzzy logic charging" that discharges the pack down to 2.6 volts and then trickle-charges for 10 seconds before charging at the selected amp rate. We'll leave the definition of "fuzzy logic" to Ind: "During charging, the 16X2 constantly collects data, input voltage, output voltage, and current, and stores them in its memory. Then, the unit generates high-resolution moving averaged data sets. The fuzzy logic program then monitors the stored data sets and compares them to its built-in memory bank. When a matched pattern is detected, the unit stops charging." Uh-huh. We found this mode gave the same solid peak charge as Mode 1. Mode 3 is a simple 4A discharge, and Mode 4 is a cycling program that will charge and discharge the pack once at the selected charge amperage and fixed, 4A discharge rate.



## ADJUSTABLE PARAMETERS

- Charge amperage.

## AT A GLANCE

- AC/DC.
- 4 to 7 cells.
- 6A maximum charge rate.
- Retail \$119.95.

## WHAT'S HOT

- Inexpensive.
- Very small case.
- No power supply required.

## WHAT'S NOT

- Low discharge amperage.
- Unit does not retain data after charge.

## PICKING A POWER SUPPLY

Those of you who plan to jump up from a plug-in charger to one of the high-zoot, DC-only charger/dischargers listed here will have to consider the expense of the separate power supply needed to run your new battery blaster. Here are some options to consider:

■ **Automotive battery.** Is this really an option any more? It is if you're popping the hood to charge packs out in the field, but as a carry-on to the pit area, forget it—too big, too heavy, too unwieldy. Moving on ...

■ **Automobile/motorcycle battery charger.** Set for 10 amps (don't use the 50A setting!), an inexpensive auto/moto charger will effectively operate a charger as long as you aren't charging at a rate higher than 10 amps. However, the DC voltage that comes from an auto/moto charger isn't "clean"; the voltage and amperage can waver, and that can affect the accuracy of your R/C charger's peak circuitry. You can "smooth out" the DC output if you connect the auto/moto charger to a motorcycle battery and then connect the battery to the R/C charger, but that's a whole lot of gear to lug around.

■ **Dedicated DC power supply.** Now you're talkin'. A good 10- to 15A power supply designed for R/C use offers significant advantages. It's smaller than the other options, so it's easier to transport and takes up less pit space, and the DC current is "filtered," so you get clean power for accurate charging. R/C power supplies use threaded clamping terminals and/or banana-plug jacks for easy charger hookup (instead of clumsy, oversize alligator clips), and some units also include separate jacks to operate lathes and tire truers. If you're stepping up to a pro-level charger, go all the way and get a decent power supply. Don't just look at it as a troublesome additional purchase to get your charger running; a high-quality power supply will serve you well for years in many applications. Hobbico\*, Victor\*, Rivergate and Pyramid\* are the big names, and you can expect to spend about \$100 to \$150 for a good unit.

## HONORABLE DISCHARGE

All of the chargers in this guide can dump your packs, but a discharge capability can be of dubious use if the amp rate is too low. Most racers discharge their packs with loads of 20 to 30 amps, typically using 1157 automotive brake lamps wired in series as the load. This simulates the amp loads encountered in a race, and cycling packs at this rate helps keep them "trained" to deliver the required amperage. Some chargers' discharge functions cannot duplicate these loads and only offer a meager 5 amps or less

(which is fine for draining off residual voltage after a heat). Unless you want to "train" your packs for low-amp, long-duration operation, avoid low-amp discharging functions when cycling packs and stick with an independent discharger. This is not meant to suggest that chargers with low-amp discharge functions should be avoided, but if you plan to use your charger's onboard discharger for cycling, make sure it can provide a load of at least 20 amps.



## KO Propo BX-212 Advance/DX-102 Level/Triplex System



The KO system is actually two independent units that are linked together; the BX-212 Advance is the charging component, and the Level is the discharger. The Advance is relatively basic; it peak-charges 1 to 10 cells and uses a dial to adjust current from 0.3 to 5 amps and uses an LCD display to show voltage, charge amperage, capacity in milliamp hours, charge time in seconds, and peak and supply voltage. The Level will discharge packs at 1 or 5 amps and displays capacity in milliamp hours; discharge time in seconds; average voltage; and supply voltage. Voltage cutoff is adjustable from 0.8 to 1.15 volts, and a built-in fan keeps the unit cool. The Level is linked to the Advance via an optional bus cord that allows the system to be set to automatically complete a charge/discharge or discharge/charge cycle. A third component, the Triplex Auto Charge Unit, allows the Advance to charge three packs in sequence. This is great for charging at the track, where frequent interruptions for practice, heats, hot dogs and practical jokes might make you forget to put the next pack on the box. Simply plug the Triplex into the Advance, plug three packs (which must be of the same type and capacity) into the Triplex, hit "start" and go about your business.



### ADJUSTABLE PARAMETERS

- LCD screen contrast.
- Charge amperage.
- Discharge amperage.
- Discharge cutoff voltage.

### AT A GLANCE

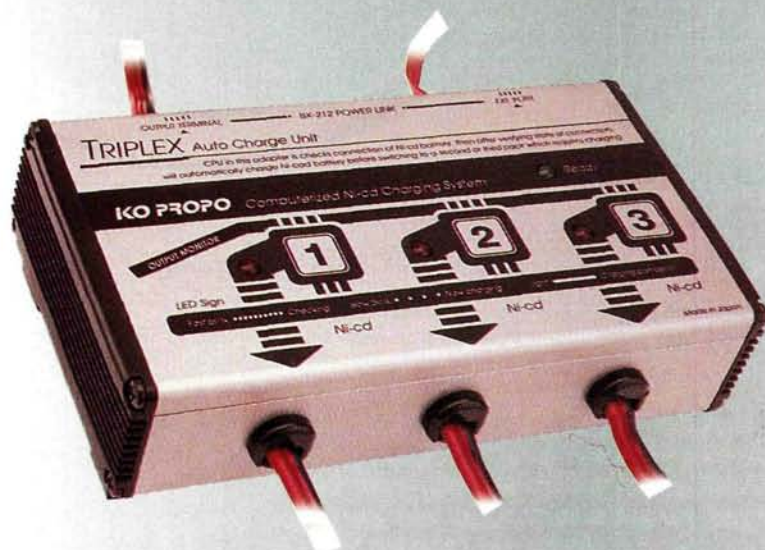
- DC only.
- 1 to 10 cells.
- 5A maximum charge rate.
- 5A maximum discharge rate.
- Retail \$229 (BX-212); \$NA (Triplex); \$NA (Level).

### WHAT'S HOT

- Very simple operation.
- Charges three packs in sequence.

### WHAT'S NOT

- Low discharge amperage.





## Maxtec/Victor IQ-3

Although the design shown here is final for the IQ-3, our preproduction sample was too new to include instructions. Even without them, the IQ-3 was not difficult to use. The dot-matrix LCD screen simply prompts you to "OK" the displayed settings by pushing the "1" key, or change the settings by pushing the "2" key and then punching in the desired value. A telephone-like keypad allows the many adjustable parameters to be set quickly and easily, and frequently used setups can be assigned to "quick keys" to avoid reprogramming the unit for each type of pack you wish to charge. Charge functions include delta peak, thermal peak (with optional temp sensor) and timed-charge modes. Amp rate and peak voltage threshold are fully adjustable, and reverse-pulse charging may be selected. The discharger function allows a healthy 33A dump, and the cutoff voltage is adjustable. For total accuracy when measuring cutoff voltage, separate ports for voltage-sensing leads are built into the IQ-3's face. The unit will measure voltage through the charge leads, but if you just gotta be accurate to the last hundredth of a volt, the independent sensor leads will do the job. For battery conditioning, the unit may be set for up to 99 cycles with the option of timed or thermal (with temp sensor) cool-off between cycles. A giant heat sink runs across the bottom of the unit; it's effective, but it would have been safer to mount the heat sink on the top of the unit where it's less likely to burn hands wrenching nearby. In addition to battery charging and discharging, the IQ-3 can test packs as well as test and break in motors.



### ADJUSTABLE PARAMETERS

- Charge amperage.
- Discharge amperage.
- Discharge cutoff voltage.
- Number of charge/discharge cycles.
- Peak threshold.
- Time delay between cycles.
- Charge/discharge cutoff temperature.

### AT A GLANCE

- DC only.
- 1 to 10 cells.
- 16A maximum charge rate.
- 33A maximum discharge rate.
- Retail \$589.95.

### WHAT'S HOT

- Super adjustable.
- Easy to use.
- Includes motor break-in function.

### WHAT'S NOT

- Large case.
- Easy to burn hands on bottom-mounted heat sink.

## BUT WILL THEY CHARGE THE NEW 3000mAh Ni-MH CELLS?

As we go to press, none of the chargers in this guide feature charge profiles tailored to nickel-metal-hydrate cells such as Panasonic's new 3000mAh units (reviewed in this issue). The Novak Millennium (which does not appear in this guide because it has no discharge function) does offer an Ni-MH mode, but it's meant only for transmitter and receiver packs and does not deliver enough amperage (in Ni-MH mode) to rapid-charge the new super cells. Does it matter? Only time will tell which type of charging is best for 3000mAh Ni-Mh packs, and you can bet that charger manufacturers will be quick to respond with "Ni-MH-specific" charge modes, but rest assured, all the chargers here can effectively juice up the new cells without any trouble.

## REVERSE PULSE CHARGING

### What is it?

There are two ways to charge a battery—linear charge and reverse pulse.

■ Linear charging is "regular" charging: energy flows into the pack at a fixed rate until the pack is fully charged. This is how chargers have operated since the days of charge cords (ah, memories ...).

■ Reverse pulse charging—also known as "Power-Flex" by Tekin and "Turboflex" by Competition Electronics—actually "burps" the pack with momentary discharge pulses as it's charging. It is claimed that this process helps break down crystals that form within the cells during repeated charge/discharge cycles, and this, in turn, increases the cells' capacity and decreases their internal resistance and increases their overall performance.



## Team Orion D-114

This simple unit can handle 1 to 14 cells and features adjustable charge rate and a large numeric display that indicates pack voltage, charge amperage and pack capacity in milliamp hours. Charge options are simply "fast" (linear charge at selected amperage) and "slow" (trickle charge at 0.2 amp). The discharge function is fixed at 4 amps. A single button selects the mode, which is confirmed by an LED next to the mode's name on the unit's face. The D-114 is a simple, reliable charger/discharger that should be perfect for budget-minded racers who are looking to get juice into and out of their packs with a minimum of fuss.

### ADJUSTABLE PARAMETERS

- Charge amperage.

### AT A GLANCE

- DC only.
- 1 to 14 cells.
- 5.5A maximum charge rate.
- Retail \$128.99.

### WHAT'S HOT

- CD display.
- Built-in cooling fan.
- Compact size.
- Simple one-touch operation.
- Fuse-protected.

### WHAT'S NOT

- No AC power operation.
- Low amperage discharge.



## Tekin BC 112C Power-Flex Charger/DIS-350 Discharger



The AC/DC BC 112C mates with the DIS-350 Discharger to form a powerful battery-cycling and conditioning system. The charger offers three Power-Flex modes to match the needs of packs in various conditions, and charge amperage is completely adjustable. Three charge modes are programmed into the unit by Tekin: peak charge, re-peak and "cold start." To avoid false peaks with those tough-to-charge packs, the cold-start function shuts down the unit's peak-detection circuitry for the first few minutes of charging. After a charge, the charge time, pack capacity and peak voltage are displayed. The discharger can be programmed for up to 9 charge/discharge cycles, using user-set values for voltage cutoff and discharge amperage. Tekin programs the unit to include a 5-minute cool-down period between cycles. Three discharge modes are offered: linear (straight dump at the set amp load), pulse (which includes charge pulses; sort of like a discharge version of reverse-pulse charging), and ramp (increasing amperage as the pack is depleted).

### ADJUSTABLE PARAMETERS

- Charge amperage.
- Discharge amperage.
- Power-Flex conditioning level.
- Number of charge/discharge cycles.
- Discharge voltage cutoff.

### AT A GLANCE

- 1 to 12 cells.
- 10A maximum charge rate.
- AC/DC operation.
- Built-in 24V, 10A power supply.
- Retail \$169.99 (BC 112C), \$199 (DIS-350).

### WHAT'S HOT

- AC/DC operation.
- Charger and discharger can be united to form a compact charge-and-discharge battery maintenance center.
- Discharger has a giant heat sink.

### WHAT'S NOT

- Charger should include built-in fan (faceplate can get quite hot).
- Expensive.



	Apex Infinity	Comp. Elec. Turbo 35	GM Racing Commander	INDI 16X2 Pro	KO Propo BX-212 system	Team Orion D-114	Tekin BC 112C/DIS-350	Victor IQ-3
Charging capability (cells)	1-7	1-7	1-7*	4-7	1-10	1-14	1-12	1-10
AC/DC	DC	DC	DC	AC/DC	DC	DC	AC/DC***	DC
Rev. pulse charging	-	•	-	-	-	-	•	•
Charge amperage	0.1-5	0.1-12	0.3-9.9	0.5-5	0.3-5	0.5-5	0.1-10	0.1-10
Discharge amperage	5	10-35	0.3-20	6	1 or 5	4	1-30	0.1-33
Adj. peak threshold	-	•	-	-	-	-	-	•
Adj. rev. pulse	-	•	-	-	-	-	•	-
Adj. discharge cutoff	•	•	•	-	•	-	•	•
Multi-rate charging	-	•	-	-	-	-	-	-
Multi-rate discharge	-	•	-	-	-	-	•	-
Pack cycling (number)	1-99	1-9	1-9	-	1	-	1-99	1-99
Input RVP	•	•	•	•	•	•	•	•
Output RVP	•	•	•	•	•	•	•	•
Overload protected	-	•	•	•	•	•	•	•
Charge time display	•	•	•	-	•	-	•	•
Discharge time display	•	•	•	-	•	-	•	•
Peak volt. display	•	•	•	•	•	•	•	•
mAh display	•	•	•	•	•	•	•	•
Internal resistance display	-	•	-	-	-	-	-	-
Chg./dischg. program memory	•	•	-	-	-	-	-	•
Internal cooling fan	•	•	•	•	•**	•	-	•
Ease of use	5	5	5	9	9	9	9	8
Instructions	5	5	5	5	7	7	8	NA
Retail	\$230	\$569.95	\$495	\$119.95	\$229.99 (BX-212), NA (Triplex, Level)	\$128.99	\$169.99 (BC 112C), \$199 (DIS-350)	\$589.95

\* maximum number of cells at highest amp setting

\*\* discharger unit only

\*\*\* also available as DC-only; BC 112C

## HOW WE RATED THEM

### EASE OF USE

Top-rated chargers have controls that make sense and label data clearly, so you don't have to decipher arcane codes and acronyms to understand what you're looking at. Lower-rated units required frequent reference to the manual; 10 is best, 1 is worst.

### INSTRUCTIONS

Higher scores equal clearer instructions; it's that simple.

## GLOSSARY OF TERMS

■ **Charge/discharge program memory**—refers to the ability of a charger to store several amp rate and voltage-cutoff settings (and perhaps other data) in memory locations for easy retrieval (instead of requiring the user to re-input data).

■ **Input RVP (reverse voltage protection)**—protects the charger from damage caused by an incorrect power-supply hookup.

■ **Milliamp hours (mAh)**—the unit of measurement used to indicate a cell's capacity. It refers to the amperage in milliamps (thousandths of an amp) that the cell can sustain for one hour. The cells in matched racing packs typically exceed their manufacturer's mAh ratings.

■ **Multi-rate charging/discharging**—any charge or discharge mode that allows the user to program amp-rate changes during the charge (or discharge) cycle.

■ **Output RVP (reverse-voltage protection)**—protects the charger from damage caused by incorrect battery hookup.

■ **Peak voltage threshold**—delta-peak chargers look for a drop in voltage as an indication that the pack has reached peak voltage. The voltage threshold is the voltage change required by the charger to indicate a peak charge.

■ **Reverse pulse charging**—a charge mode that "burps" the pack with momentary discharge pulses as it's charging. It is claimed that this process helps break down crystals that form within the cells during repeated charge/discharge cycles; this, in turn increases the cells' capacity, decreases their internal resistance and increases their overall performance.

■ **Thermal-overload protection**—protects the charger from being damaged by overheating; if overheated, it will shut down until it has cooled to a safe temperature.

■ **Trickle charge**—any type of very low amp charging (less than 0.5 amp) is considered to be a "trickle" charge.

\*The addresses of the companies mentioned here are listed alphabetically in the Index of Manufacturers on page 217. ■







# 1<sup>ST</sup> LOOK

## Associated RC10



by George M. Gonzalez

**T**he Team Associated\* RC10 TC3 is one of the most highly anticipated new R/C car releases in recent times. The TC3 is also a hot topic on the Internet: you won't find an R/C car-related news group that isn't overrun with postings about the A-Team's long-awaited 4WD touring car.



PHOTOS BY MIKE OGLE

# PRODUCTION-



## 2 WAYS TO TC3

Two versions of the TC3 will be available at your local hobby shop. The **Racer kit** includes front and rear Stealth ball differentials with carbide diff balls, Teflon-sealed ball bearings, steel turnbuckles, composite MIP CVD drive shafts, Pro-Line V-Rage tires, foam bumper, composite-body VCS shocks and one of three available Protoform bodies.

The **Team kit** includes all the Racer kit features plus blue-anodized aluminum MIP CVDs, blue-anodized Factory Team aluminum-body VCS shocks and titanium tie rods; a body is not included.

I recently met with the TC3's chief designer, Cliff Lett, at Associated's California-based facility to take a look at

the first production sample of the TC3 and to talk with Cliff about the latest revisions. The car shown on these pages is a preproduction TC3; the kits should be available by the time you read this article.

Associated doesn't plan to release a "sport" version because the Racer kit will probably end up selling for less than 150 bones—about the same as most sport-level (bushing-equipped) touring cars. If Associated's anticipated pricing is correct, the TC3 could be the best bargain in competition touring!

TC3 Racer kit; part no. 3010, Honda Accord; 3011, Dodge Stratus; 3012, Alfa Romeo 156; \$269. TC3 Team Kit; 3030, \$369.

# READY AT LAST!



## AN IN-DEPTH LOOK

### Efficient shaft-drive system

The TC3 features an ultra smooth and efficient shaft-drive system consisting of a single composite graphite center drive shaft that mates with front- and rear-mounted differentials via composite ring and pinion (bevel) gears. The drive shaft is a hollow, woven-graphite tube that is designed to have a great deal of torsional rigidity. The outdrive ends on the drive shaft are molded pieces that are glued into place with epoxy. A small amount of end play is provided between the outdrives and the input shafts to prevent the drive train from binding up in the event of a collision with a wall, which would cause the chassis to flex momentarily.

The TC3 includes a 72-tooth, 48-pitch spur gear, but a 75-tooth or slightly larger spur gear can be used as well. The diffs include 40-tooth ring gears that mate with 16-tooth internal pinion gears to provide an internal ratio of 2.5:1. The TC3 will accommodate motor pinion gears as small as 18 tooth and as large as 31 tooth; this gives the car a final gear ratio range of 5.81:1 to 10.41:1. Given the broad range of gearing choices, the TC3 should work equally well in stock and modified racing applications.

During testing, the engineers found that they could increase drive-train efficiency even more by installing an additional bearing-equipped bulkhead directly in front of the spur gear (the input shaft on the prototype was supported only in the rear). The additional bulkhead supports the rear input shaft and spur gear and prevents the pinion and spur gear from actually separating due to the motor's side-loading force—a common problem on shaft-driven vehicles with in-line mounted motors. The bottom portion of the bulkhead is molded into the chassis, and the top portion is an easy-to-remove bearing cap. Overall, the TC3's drive train is friction-free and extremely lightweight, which means that the TC3 should accelerate like the proverbial bat out of hell.

### Quadra Symmetrical Suspension

The TC3 features Associated's Quadra Symmetrical Suspension, which means that the car's inner and outer suspension-arm pivot points are in-line on both the front and rear end of the vehicle. In addition, all of the hinge pins are either captured or held in place with setscrews—no more E-clips. The car comes standard with 2 degrees of front kick-up and 2 degrees of rear anti-squat.

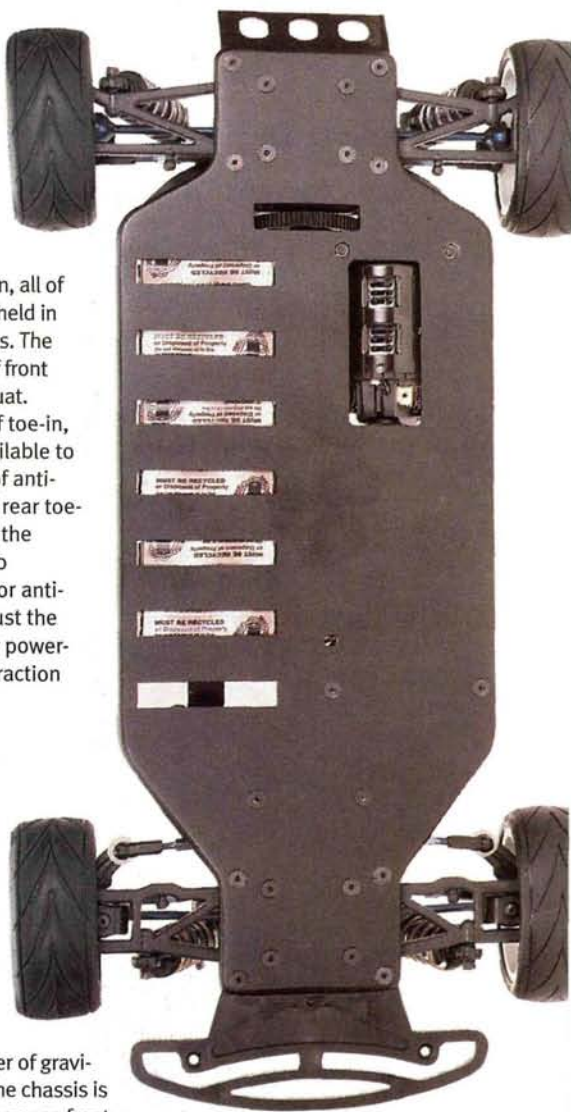
The rear end will have 3 degrees of toe-in, but optional arm mounts will be available to independently change the amount of anti-squat as well as the total amount of rear toe-in. Optional front-arm mounts allow the tuner to reduce the front kick-up to 0 degree, or even less than 0 degree for anti-dive characteristics. Anti-dive acts just the opposite of anti-squat by enhancing power-on steering and improving braking traction during deceleration.

### Weight-optimized chassis

The TC3 features a molded, semi-tub chassis that's designed to accept 6-cell stick, side-by-side or saddle-pack-configuration battery packs. Seven slots have been molded into the left side of the chassis to allow the battery pack to be mounted as low as possible, which will lower the car's overall center of gravity (CG). An additional battery slot in the chassis is provided to move the cells forward (increase front traction) or rearward (more rear traction). If a saddle pack is used, the cells can be split up—with the empty battery slot between them—to distribute the pack's weight evenly across the chassis. A molded battery strap makes securing the cells quick and easy.

The motor, ESC, receiver and steering servo are all mounted on the right side of the chassis; this setup counterbalances the weight of the battery pack quite efficiently. According to Associated, the TC3 can be set up with a nearly perfect side-to-side and front-to-rear weight ratio, but attaining the exact balance will require carefully chosen electrical components because servos, receivers and ESCs vary greatly in size—and, therefore, in weight.

The motor is mounted in-line on an adjustable motor mount. As you can see, the motor mount now includes a finned aluminum heat sink to help dissipate heat. The prototype's motor mount was a separate machined-aluminum piece that was bolted to the chassis with two screws. The production version has a motor-mount bulkhead that's molded into the chassis, and a separate, machined-aluminum upper mount actually clamps down on an eccentric mounting plate that's secured to the motor. Pinion-gear changes can be easily accomplished by loosening a single screw and sliding the motor off to the side. Once the motor-mount screw has been loosened, the motor can be removed completely just as easily.



## What's Next?

As time goes on, Team Associated will release a variety of weight-saving and ultra-rigid, graphite-composite components for the TC3. In fact, just about every molded piece will have a graphite composite counterpart. Keep in mind, however, that the Racer kit is nearly 2 ounces below ROAR's minimum touring-car weight, so if you plan to compete at a ROAR-sanctioned event, be sure to take along some ballast. And for those racers who like to add some color to their ride, many aluminum components will be offered in Factory Team blue.

From the very beginning, Team Associated's designers envisioned a gas-powered version of the TC3. As soon as the electric kits leave the factory, Team Associated will begin work on a nitro-powered version; their goal is to use many of the electric vehicle's drive train and suspension components. This will certainly cut down on tooling costs and ultimately bring down the kit's cost, as well.



## Quick-access diffs

Both the front and rear Stealth differentials are in sealed housings to reduce the need for maintenance by preventing small bits of debris and road grime from chewing up the gears and contaminating the diffs. The gear cases have changed slightly from the prototype versions; besides being more tapered or cone shaped, the cases are structurally more solid yet provide quick access to the diffs. The wing-shaped chassis braces that were molded onto the gear case on the prototype are now separate pieces; this also facilitates diff access. Remove six screws, and the diff is in your hand.

The front and rear diffs are interchangeable, and the diff rings, balls and thrust-washer assemblies are all standard parts that are used on other Associated car kits. This means spare parts will be readily available!

## Sliding rack steering system

The TC3 is the first vehicle to feature the unique "Associated true Ackerman concept" (ATAC) steering system which, in this editor's opinion, is probably the most technologically advanced steering system ever found on an R/C car. In a nutshell, the system is designed to provide the proper Ackerman angle at all times, and this makes handling more consistent, allows the car to carry more speed through the corners and helps reduce tire wear. In addition, the system is fully ball raced and features a built-in servo-saver that is easily adjusted through a slot in the bottom of the chassis.



*The finned motor mount is an inspired touch. Notice the dogbone end of the center drive shaft.*

## MIP/Associated CVDs

The TC3 Racer kit will include really trick molded plastic MIP/Associated CVDs. The steel axle portions are designed and manufactured by MIP, but Associated molds the plastic dogbones and CV joints. The dogbones have hard steel drive pins and should last as long as the standard steel CVDs. The TC3 Team kit will come equipped with blue-anodized aluminum MIP CVDs to match the rest of the car's Factory Team blue-anodized components. The molded CVDs are actually lighter than the aluminum units and, according to Associated, are more durable.

## Built-in swaybar mounts

The gear cases now have built-in swaybar mounts, and the front and rear suspension arms feature molded-in ball joints to accommodate optional adjustable swaybars. Associated decided not to include the swaybars with the Racer or Team kits because they will hardly ever be needed and will only make tuning more complicated. Of course, if you plan to race on carpet, the swaybars might come in handy and will be available as a Factory Team optional part.

*Note the standard, 12mm wheel hex and molded-in swaybar pivot ball.*



## Factory Team ball bearings

The TC3 Racer and TC3 Team kits come equipped with sealed ball bearings (Team kit bearings are Teflon-sealed). This is a great feature because sealed bearings require only occasional maintenance, and the Teflon units operate with very little friction.

## Molded production pieces

In previously published photos, the TC3 prototype featured woven-graphite shock towers and machined suspension arms, but the production kits include molded shock towers and suspension arms that look extremely high tech. The new shock towers feature several upper shock-mounting positions for additional tuning versatility. Although the front and rear suspension arms are different, the left and right arms are the same. This makes building and maintaining the vehicle much easier and reduces the need for spare arms.



*The steering rack slides on bearings, just visible here.*

## Front and rear bumpers

A foam front bumper is included with both versions, and it helps protect the chassis as well as the body during heated competition. A nifty little bumper is provided for the rear of the vehicle as well, and it looks very trick mounted on the car.

*\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.*



## ROAR Motor Updates

**R**OAR recently finalized its specifications for rebuildable stock motors, and these specs were sent to all motor manufacturers and to the ROAR motor lab so technical inspections can begin. Beginning July 1, 1999, rebuildable stock motors will be legal for ROAR-sanctioned racing. Like all other motors, rebuildable stockers must be approved by the ROAR inspection lab and appear on ROAR's approved motor list to become legal. If you plan to compete at a ROAR-sanctioned race, make sure to check out the ROAR website ([www.roarracing.com](http://www.roarracing.com)) for the latest list of

approved, rebuildable stock motors.

ROAR has also finalized the specs for 5-degree, locked-timing stock motors, and any 5-degree motors approved by June 30, 1999, will be legal for ROAR competition for three years. No 5-degree motor from any manufacturer will be considered for approval after the June 30 deadline. At the end of the 3-year period, new motors may be submitted for approval for the next 3-year period. ROAR hopes that this new concept will control the "motor of the week" syndrome and help make stock racing more fair.



## Team Yokomo Wins LRP Touring Car Masters

**M**ore than 140 drivers from three continents competed at the LRP Touring Car Masters held in Heidelberg, Germany, this past March. Team Yokomo driver Masami Hirosaka TQ'd and won the event, while teammate Barry Baker finished second for a one-two Yokomo knockout. An interesting aspect of their success in Germany is their choice of chassis; both Hirosaka and Baker drove box-stock versions of Yokomo's new MR4 TC "budget" touring cars. I guess the cars worked well for the guys; they lapped the field in all three Mains to easily win the event. Here are the top 10 finishers in the Masters class at the LRP Touring Car Masters:

- 1 Masami Hirosaka (Yokomo/Japan)
- 2 Barry Baker (Yokomo/USA)
- 3 Benjamin Groshi (Losi/Germany)
- 4 Teemu Leino (Schumacher/Finland)
- 5 Josh Cyrul (Losi/USA)
- 6 Reto Konig (HPI/Germany)
- 7 Steven Pole (Schumacher/England)
- 8 Frederick Mathiesen (Schumacher/Germany)
- 9 David Spashett (Losi/England)
- 10 Richard Barton (Schumacher/England)

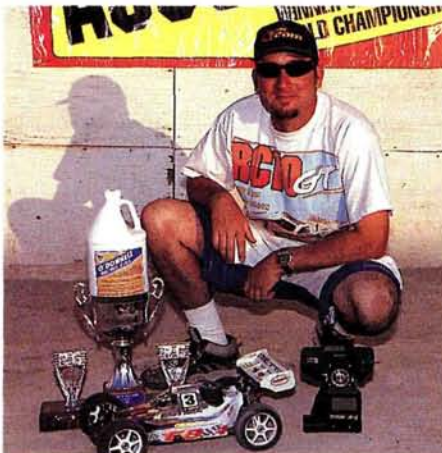
## New, Affordably Priced Kawada SV10

**K**awada USA announced that a "sport" version of the company's national championship-winning SV10 will soon be available. The new model, called the SV10 GT, will include an FRP chassis, metal bushings, dogbones and plastic friction shocks that can be converted into oil-filled units; all this to keep its low, suggested retail price of \$225. The kit will, however, include

front and rear adjustable ball diffs, turnbuckles, an externally adjustable rear belt tensioner, radial tires and a Lexan body. The SV10 GT is also 200mm wide; while this may not be ROAR legal, it sure gives the car a heck of an advantage at club races. We'll pass along more info and photos of this new budget contender as soon as we can.

## Silver State Nitro Challenge Results

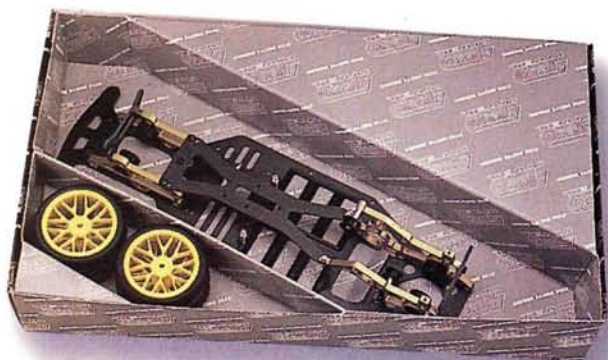
**T**eam Orion/Thunder Tiger factory driver Richard Saxton took the new Thunder Tiger EB-4 1/8-scale buggy (we scooped it last issue—remember?) to the winners' circle on its first outing; he lapped the field and put in 124 laps in 60 minutes. Quite the auspicious beginning for Thunder Tiger! Top qualifier Saxton didn't have it so easy for the first 30 minutes of the race, however; Associated's Mark Pavidis, driving a Mugen MBX-4, and Jason Ashton, driving a Kyosho MP6 International, swapped positions many times with Saxton during the first half of the race but finished with matching DNFs after dropping out due to technical problems—that's gas racin'. Plenty of 1/10-scale action went down as well, as Team Associated factory driver Billy Easton took the TQ and lapped the field in the 1/10-scale Truck class, while Jim Silvey picked up the win in 1/8-scale Truck after defeating top qualifier Edward Wong in the Main. Look for complete coverage of the '99 Silver State Nitro Challenge in an upcoming issue of *R/C Car Action*.



**Richard Saxton accepts the first-place trophy and thanks his sponsors. This was his first race with the new EB-4.**



## RACER news



### Team Corally C4 Touring Car Available at Last

by the time you receive this issue. Here's a quick look at some of the car's more notable features. Watch for an exclusive "Thrash Test" on this new European contender in the next issue of *R/C Car Action*.

- Symmetrical true-balance design with centrally mounted motor and batteries ensures well-balanced handling on the track, regardless of battery configuration.
- Sturdy suspension system with adjustable caster, camber, roll center, ride height and front width.
- Lightweight and strong "continuous velocity system" drive shafts.
- Large front and rear ball diffs and belt pulleys that ensure friction-free operation.
- Adjustable one-way drive system that can be locked to provide continuous 4WD power transfer.
- Graphite double-deck chassis with a molded battery tray that's keyed to the chassis to mount the cells as low as possible while providing a non-conductive mounting surface.
- Gold-anodized aluminum front and rear bulkheads that are lightweight and strong.
- ... and much more.

### Jammin' Products for your Nitro Rig

Jammin' Products has just released a new line of graphite and machined-aluminum components for many popular nitro-powered off-road models. Jammin' Jay Halsey, a former ROAR national champion, has been manufacturing graphite and machined-aluminum components on an OEM basis for many well-known R/C manufacturers, and his company now produces hop-up parts that will soon be available at a hobby shop near you.

Shown here are some of the components the company offers for the Mugen MBX-4 and the Kyosho MP-5 and MP-6 1/8-scale off-road buggies. Jammin' also offers super-thick shock towers for the Associated RC10GT and Team Losi NXT. Give Jammin' Products a call at (909) 465-9728 for more information.



### New Touring-Car Body Choices from Andy's R/C Products

Andy's 190mm Stratus has become the number-one-selling TC body in the U.S., and it won our '99 Readers' Choice Award for favorite body. A 200mm version of the Stratus called the Nitro Rocket is also becoming a popular choice with nitro TC racers. Company owner Andy Jacobsen announced that two new, high-performance TC bodies will be added to the Andy's Lexan body line very soon; look for a BMW and, possibly, a Volvo from Andy's in the near future. Of course, both bodies will feature Andy's wind-manipulating designs that offer maximum performance. To make painting and detailing a little easier, Andy's bodies will also soon include decals for front grillwork, front and rear illumination and window masks.

### RACER TIP OF THE MONTH

**Regan LeBlanc** Team Orion/Associated driver Richard Saxton's trusted mechanic



Have you ever had the grub screw loosen up on your MIP CVDs and then DNF'd when the drive pin ejected out of the axle? Believe it or not, this has happened to some pro drivers, even after liquid thread-lock had been applied to the grub screw. Here's a tip to keep the drive pin in place, even if the grub screw that secures it loosens up. Cut two small pieces of large-gauge shrink-wrap tubing (available at hardware stores and most hobby shops), and slip a tube over each axle. Apply heat to the shrink-wrap so it conforms to the shape of the CV joint (covering the drive pin). This will keep the axle together and save your bacon in a race, but remember to periodically change the shrink-wrap and check that the grub screw is tight.





## RACER PROFILE

## Billy Easton

Billy Easton not only races for Team Associated, but he also works at the company's California-based facility. Billy is well-known in the R/C racing industry; he's a regular A-main finalist at just about every major racing event. That isn't surprising; after all, he practices with Mark Pavidis every week, and the two share their setup and driving strategies. I caught up with Billy during a break at the Pro-Line and R/C Car Action Cactus Classic and, as always, he was eager to share his thoughts.

### VITAL SIGNS

**Age:** 21

**Occupation:** ESC repair and inventory receiving for Associated Electrics

**Hometown:** Laguna Beach, CA

**Years racing:** 7

**First R/C car:** Kyosho Rampage (gas)

**Favorite racing class:** 2WD modified

**Favorite track:** So Cal Raceway in Huntington Beach, CA, and Hot Rod Hobbies in Saugus, CA

**Sponsors:** Associated, Reedy Modifieds, Pro-Line, Airtronics, Dynamite, LRP, Lunsford, MIP, Kimbrough, O'Donnell and Mechanics Wear

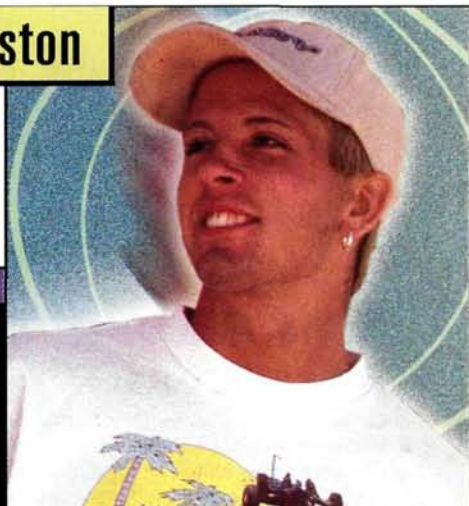


PHOTO BY GEORGE M. GONZALEZ

#### Radio Control Car Action: How did you first discover R/C racing?

BE: My first R/C car was a Kyosho Rampage, which was a gas car. My dad actually convinced me to get a gas car instead of an electric. The Rampage was not a good car for beginners because the first time I ran it, I burnt up the engine because of my lack of engine-tuning knowledge. I then picked up a Kyosho Ultima, and a few of my high-school friends and I started racing at a track near my house.

#### RCCA: How often do you practice to keep yourself in tiptop shape?

BE: The way R/C works is everybody starts at the bottom. And you go up and up over the years and, obviously, the more time you put in it, the better you get. But once you reach a certain talent level, you know the fast line, you know how to get around the track, and you know how to tune your car, so you've basically acquired all the skills necessary to win a race anywhere in the country. I generally race at least once a week just to keep up my racing skills and my eye-to-hand coordination. When I travel to a race, all I have to do is dial in my car and get familiar with the track layout.

#### RCCA: That's an interesting response. All right, tell me this: do you get to race or practice much with Mark Pavidis now that you work together at Associated?

BE: Actually, Mark and I work as a team; that is, we share setup information and give each other input. We race each other weekly, and when we do, it's like the Nationals because we're always fighting over who will get the TQ. Then we go back to the office and the loser usually takes abuse from the winner for the rest of the week until we race again. It's fun; we push each other to go faster.

#### RCCA: Who's your favorite competitor?—on an opposing team, that is.

BE: I have to say it's Brian Kinwald.

#### RCCA: Speaking of Brian, I noticed that you and he had quite a little battle going on in the 2WD class at the Florida Winterchamps. I mean, you guys were getting extremely aggressive on the track to the point where I thought for sure that both of you would be warned by the race director. What gives?

BE: Well, when Brian and I compete at club races, it's usually very clean. In the Mod Truck class at that event, I had to beat Brian in the third and final Main to secure third place overall. Brian already had second place sewn up, no matter what, and Mark Pavidis had already won the race. But when we came down to the last corner coming onto the straightaway, Brian hit the rear of my truck, which spun me out, and he beat me to the finish line. Because of this, Mark Francis ended up ahead of me on points, and he took third place overall while I was thrown out of the top three.

In one of the 2WD Mod class Mains, I actually drove over Brian's car after gassing it through the last corner, which was kind of like a steep down curve. This was actually the same corner that Brian took me out on earlier. I did this completely unintentionally, of course, but I think Brian thought I did it on purpose—kind of like I owed him one. At the trophy presentation, Brian and I laughed about it. Everything is cool.

#### RCCA: So what are some of the things that you like to do when you're not racing R/C cars?

BE: I like riding BMX bikes, and I just built a Specialized aluminum Y-frame. Unlike in R/C racing, it's very hard for someone to take you out on a BMX bike; you're more in control. It's the guy who's the most fit and can go through the jumps fastest who wins the race. In R/C, you can never tell what somebody is going to do when they're in front of or behind you; there's a lot more luck involved. I also like to go to the beach and hang with the people I care about.

#### RCCA: What are some of your aspirations in life? Any goals you're shooting for?

BE: Well, I would really like to go back to school. It's not that I think I'm wasting my time with R/C; I have a talent for it, and I get to travel a lot, see new places and meet new people; I'm very fortunate in that. For someone like me, who races and works for an R/C factory, it's very hard to give it up.

#### RCCA: You're obviously more of an off-road racer, Billy, but will you give on-road racing a try when Associated releases the TC3 touring car?

BE: I will soon be racing all of Associated's on- and off-road cars, including 1/12-scale and touring car.

#### RCCA: Do you have any words of wisdom to pass along to aspiring sponsored R/C car racers?

BE: Just like anything else, it's all mental preparation. If you're down and out, you're not going to do well. Let's say you go to the gym, and one of the machines has a lot of weight on it; if you think you can't lift it, you probably can't; you have already defeated yourself. If you think positively, chances are that you can lift the weight and probably more. When it comes to R/C racing, keep your hopes high but realize that there will be good days and bad. Just don't let the bad days get you down; keep trying.

RCCA: Thanks for your time, Billy, and good luck at the races.



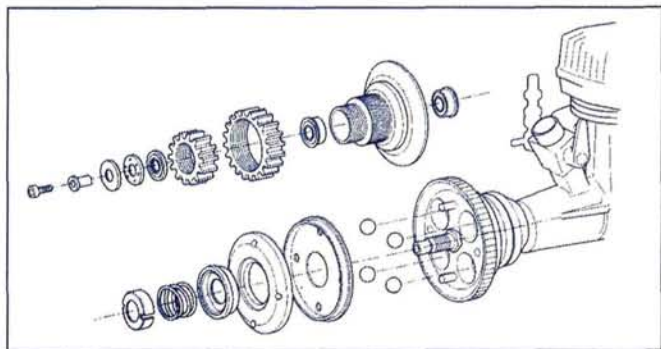
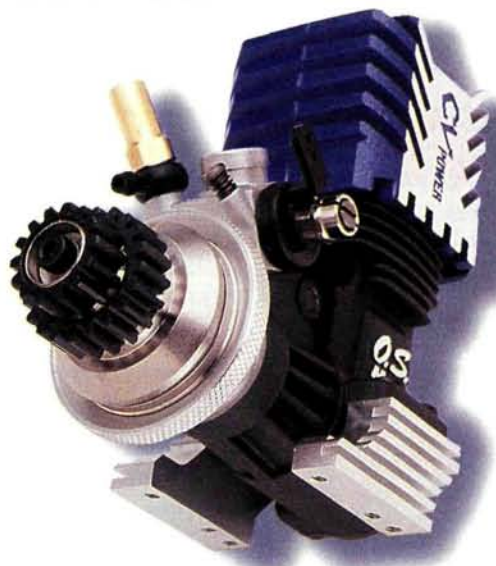


# RACER news

## Speed Shop

### "The Admiral" Clutch from Cross

Cross Racing Equipment\*, a well-known manufacturer of aftermarket suspension components and chassis, has released a new clutch kit for Kyosho's popular GP-10 cars to fit on O.S. engines. Called the Admiral clutch, it allows you to adjust clutch engagement. The Admiral works by forcing large ball bearings out of divots in the flywheel when the engine increases rpm. Centrifugal force pushes the balls into a pressure plate that is loaded by a spring and nut. Tightening the nut will allow the engine to rev higher before the clutch engages; loosening it has the opposite effect. The pressure plate pushes a composite disk into the 2-speed clutch bell that's threaded to allow quick gear-ratio changes. All the hardware necessary for the conversion is supplied, as are new, lightweight, cooling engine mounts and spacers. Contact Cross Racing for more information.



### Golden Horizons Turbo Head

Golden Horizons\* has released a new conversion head that allows a .12-size engine to use a turbo plug. The Turbo Head—specifically designed for use with the O.S. CV, CZ, Force .12 and Colt 12 and 15 engines—will improve acceleration and top speed. Golden Horizons boasts that simply adding the head will increase an engine's horsepower by 10 to 20 percent and will also provide superior cooling. It also helps the engine to lose rpm when the driver lets up on the throttle, and this permits harder driving into the turns. The two-piece Turbo Head comes in blue- and purple-anodized aluminum. Part no.—GHCP014; \$29.99.



### CEN 2-Speed Tranny

Newcomer CEN\* has entered the American R/C market at the hobby's entry level but offers some interesting pro-level cars and hop-ups; for example, its 2-speed automatic transmission for the HPI Nitro RS4 and Kyosho GP10 Spider and SuperTen cars. The kit includes an ultra-light threaded clutch bell that allows the first and second clutch-bell gears to be changed without removing the engine. The gears are made from aircraft aluminum and are anodized in various colors for easy identification. Additional clutch bell-gears are sold separately, and four spur gears (also color-coded) are available to arrive at a number of final gear ratios.

Part nos. G84302—Kyosho SuperTen; G84304—Kyosho Spider; G84306—HPI Nitro RS4 series; \$109.







# MIP

Race With US

## RACER news

### Speed Shop

#### HPI Super Nitro RS4 Hop-Ups

HPI\* has just released several key hop-ups for the Super Nitro RS4 that will not only help lower your lap times and make the car more versatile but will also make you the envy of your track. The car shown in the photos happens to be HPI designer Akira Kogawa's personal Super Nitro RS4, and it's loaded with new hop-ups. Here are some of the parts you can expect to see at your hobby shop by the time you read this:

The Super Chassis is made from high-grade 7075 aluminum, is 3mm thick and is completely countersunk—including the engine-mounting holes. The graphite upper deck can be quickly removed from the chassis by releasing two body clips; it's much lighter and looks much cooler than the stock molded top plate. Front and rear universal dogbones transfer power much more efficiently than the stock dogbones, and they feature an extra-strong stub axle for increased durability. The foam front bumper protects the chassis and body from damage, and its stainless-steel hinge pins operate more smoothly and don't bend as easily as the stock step-screw pins.

The 2-speed tranny, graphite rear brace, hard-anodized shocks, receiver protector, Nitro Star Pro 12R SC engine, tuned pipe and header are all Nitro RS4 hop-ups that work equally well on the Super Nitro RS4. Call your hobby shop or HPI for more information.

**Super Chassis**—part no. A966; \$95.

**Graphite upper deck**—73004; \$28.

**Universal dogbones (F/R)**—A521/A522; \$34.

**Foam bumper**—6277; \$8.

**Stainless-steel hinge-pin set**—72016; \$17.

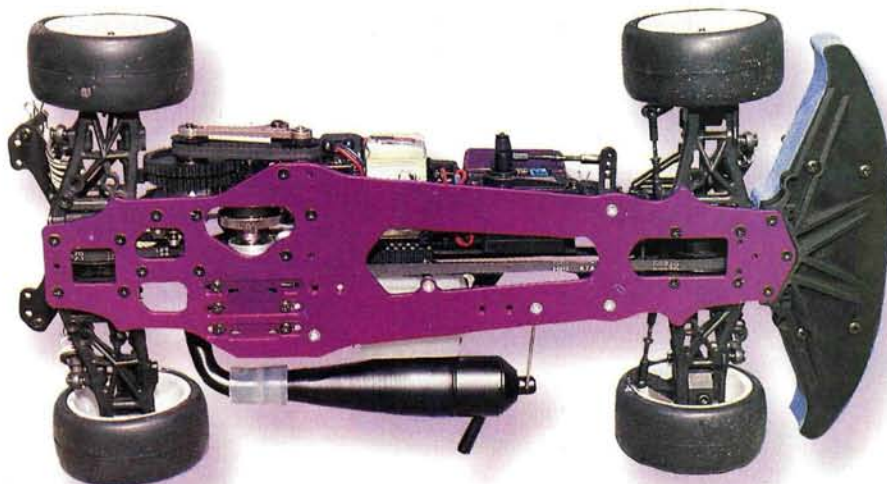


#### Traxxas Nitro Cleaner

Let's face it: nitro-powered R/C cars and trucks can get pretty dirty during a full day of racing, and cleaning them up afterward can sometimes be a chore—especially if you stow the car in a remote corner of your garage for a week while you wait for the nitro fairy to come spit-shine it. Since that's never going to happen, listen up! Traxxas\* sells a product that nitro racers will not want to be without.

Nitro Wash nitro car cleaner is formulated to quickly flush away nitro oil and grime and leave your vehicle looking like new. Unlike other available cleaners, Nitro Wash comes in a pump spray bottle that's more efficient than an aerosol can because its nozzle can be adjusted to spray a fine mist or a direct stream. Nitro Wash evaporates quickly and doesn't leave an oily residue, and this makes it perfect for prepping mounting surfaces for self-adhesive products as well as for many other uses. Nitro Wash comes in a 32-ounce bottle and is economically priced. Check out this stuff; it really works.

**Part no. 5050; \$6.99.**



\*Addresses are listed alphabetically in the Index of Manufacturers on page 217. ■









**F**ew large, off-road racing events are dedicated to sportsman drivers these days. Sure, many stock-class championships are up for grabs each year, but the competition there can be even tougher than the competition in expert mod.

So where do sportsman drivers go to get a taste of what it's like to compete at a large, professional racing event and not have to beat dozens of sponsored drivers just to make the C-main? Well, every spring, Pro-Line and R/C Car Action sponsor the Cactus Classic hosted by Scottsdale R/C Speedway in beautiful Scottsdale, AZ. If you're just getting started and would like to test your talents by competing against drivers of equal skill, it's the place to be.

Pro-Line and  
Radio Control  
Car Action  
present the

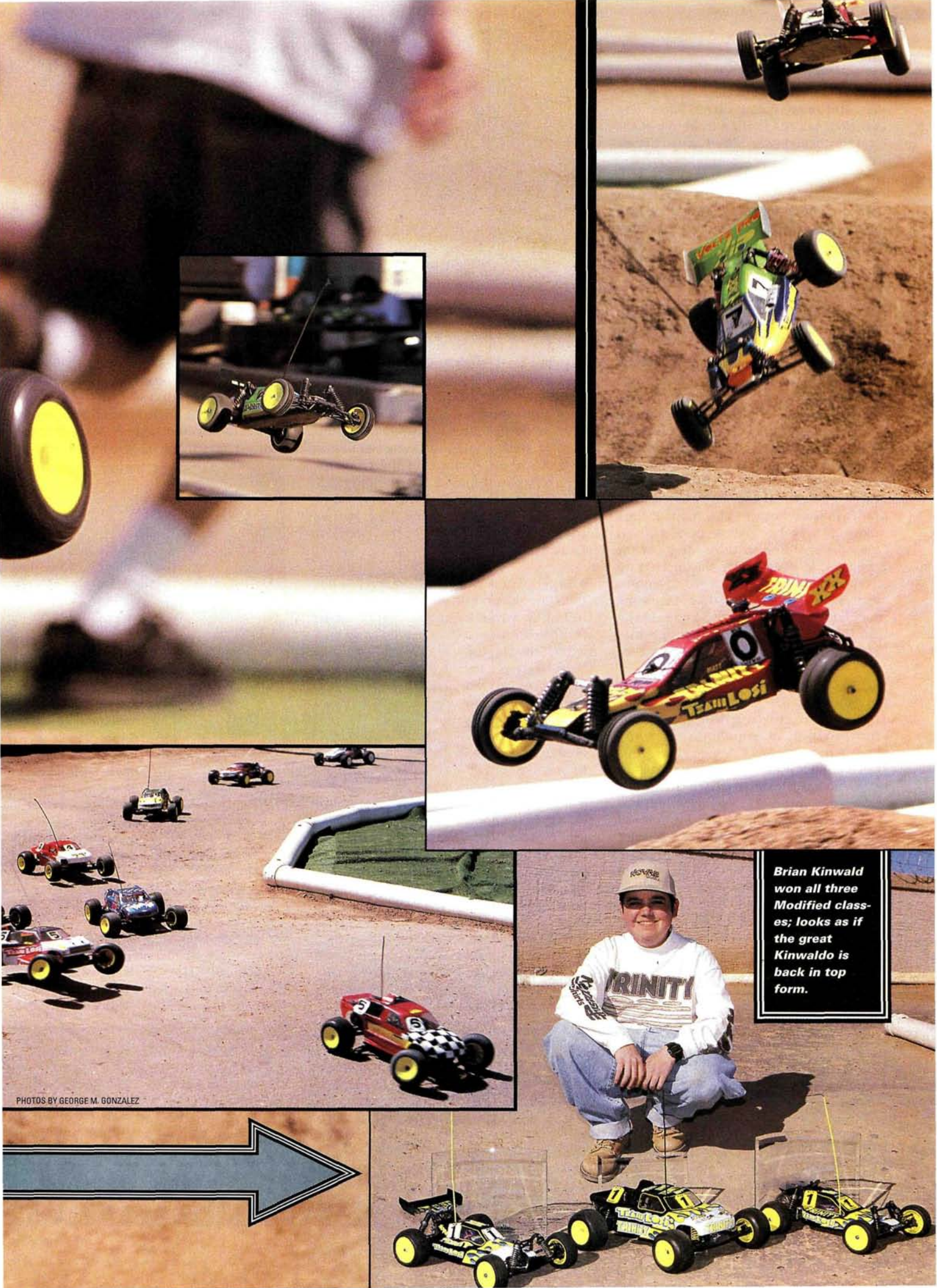
13TH ANNUAL

# CACTUS CLASSIC

## KINWALD'S REVENGE

by George M. Gonzalez





Brian Kinwald won all three Modified classes; looks as if the great Kinwaldo is back in top form.

PHOTOS BY GEORGE M. GONZALEZ





Of course, the Expert Mod classes attract some of the country's most talented drivers, and many racing careers have been launched as a result of a win in one of the Expert Stock classes. The Cactus Classic has a racing class for everybody, and that's why, after 13 years, it's still extremely popular. Now it's time to sit back and check out the action at the 13th annual Cactus Classic as I saw it through my camera lens. Enjoy.

## OVERVIEW—A-MAIN AND QUALIFYING

• **2WD Stock.** A single decisive main event determined winners in all of the stock classes.

At the start, TQ and pole sitter Chung Park had a bad time when his car was tossed, punted and thrown back into sixth. Mike Pertile ended up in first after a rough start, and Joe Pillars found his way to third. Meanwhile, Rick Madison was right behind him. Trying to pass Pertile, Pillars flipped his truck, and that caused a major change in the running order. Madison was now in the lead, Pillars made his way back to second, and Ed Driscoll was riding in third—but not for long because Brian Kadar was picking up steam and pushing Pillar's truck around every corner. When the end-of-race tone sounded, it was Madison who crossed the line first for the championship, while Pillars claimed second and Kadar third.

• **2WD Expert Stock.** After a rough start that shuffled the grid order, TQ Brent Thielke shot out in front with Justin Morrison and Andy Smolnik following close behind. Soon, the ever dangerous Team GM driver Jimmy Babcock started to make his way from the back and went around Smolnik into third. Coming into the straightaway, Morrison hammered Thielke from behind, and the two buggies tangled long enough for Babcock to sneak by, take the lead and, eventually, the championship. Morrison recovered in time to claim second, but TQ Thielke ended up in sixth. Joey Stanovich, who was cruising around the middle of the pack, moved in to claim third.

• **Truck Stock.** After a major first-turn pileup, TQ David Pillars was thrown to



Brian Kinwald (left), Jim Gard (center) and Greg Hodapp bench race during one of the breaks.

the back of the field, while David Anderson took the lead and Earl Valles claimed second. After five laps, it was evident that Anderson would win the race because he had already lapped the entire field, including Valles who was still in second. Anderson easily won the race and the championship and was the only driver to take the extra victory lap; Valles stuck it out to claim second; Nick Stenzel took third after doing battle with Ed Driscoll and Kent Beal.

• **Expert Truck Stock.** TQ Michael Philip used his prime grid location to get the holeshot, while Randy Brown and Joey Stanovich followed close behind in second and third. The top three leaders tangled going around every corner, and as a result, Philip's truck was used, abused and tossed to the back. Brown and Stanovich continued to bash each other around until Brown was thrown to the back of the pack. Stanovich had the lead and Justin Morrison and David Goss were contending for second. After the dust had settled, Stanovich was declared the victor; he had won the Expert Truck Stock championship. Goss took second while Morrison claimed third.

• **2WD Modified.** The drivers in all of the Modified classes faced triple A-mains with one throw-out round.

**A1-Main.** TQ Brian Kinwald shot out in front and stayed there; Matt Francis claimed second and tailgated his teammate



Above: the original "bad boy" of R/C, Jeremy Kortz, is a past Reedy Race Invitational Class champion and a NORCCA national champion. Keep an eye on this guy, 'cause he just might go far. Left: Efrén



Saenz enjoys racing with his 8-year-old son, Adam. Adam finished in fifth place in the 2WD Stock class D-main. Way to go, Adam!

for the first couple of minutes. Meanwhile, a battle for third raged between Team Associated driver Billy Easton, Team GM driver Brian Dunbar and local favorite Jim Gard. At the close of the

Team Orion just might be the first R/C company to have its team drivers use bodies painted in the same colors and design: purple, silver and white predominate, and Orion must approve individual decal placement. Team Orion and HPI decals will be in the most visible areas; other sponsors' decals may be placed in other, less prominent locations. From now on,

## Team Orion's New Colors

I think this is a cool idea; having team colors adds a professional touch to the sport and gives the team drivers a sense of belonging that was absent in the past.

If there's a downside, it's that having many, almost identical cars on the track at the same time can make following the race a little confusing for spectators, the announcer and even the drivers. Each vehicle is assigned its own, prominently displayed number, so I didn't have any problems figuring out who was who on the track, and—more important—the drivers didn't seem to mind.



## The R/C Car Action Silver Cup Concours

Every year at the Cactus Classic, *R/C Car Action* sponsors a concours event and awards a silver cup to the driver with the coolest paint job. This was my second year as a judge, and again, I had a very difficult time choosing a winner. Of the over 30 cars and trucks entered, only one would earn the coveted giant silver cup. Because there were so many great efforts, I decided to honor first and second runners-up, as well.

**Flyin' Ryan** Mayfield took top honors with his Cactus Classic theme truck with Ninja Turtle driver figure and buzzard copilot. The truck features a desert landscape overrun by cacti. Congratulations, Ryan; I hope you find a good place to display the cup (which is actually larger than a punch bowl!).

To me, Paul Frazier's M&Ms truck had the most entertaining paint job, and it looked as if it had taken many long hours to give it such great detail. Unfortunately, the aluminum-foil-wrapped roll bars marred this otherwise perfect concours entry, but it was good enough to take first runner-up honors.

**Blade Luna**, second runner-up, was recognized for his subtle yet ultra-detailed truck that featured an extremely realistic interior.



race, Easton had won the battle for third while Kinwald and Francis took first and second, respectively.

**A2-Main.** After a terrible start, Brian Kinwald went from his pole-position start directly to last place. Billy Easton took the lead, but Jim Gard was all over his tail and Greg Hodapp was also close behind looking for trouble. After about five laps, Easton's lead was longer, and Gard and Hodapp were still battling for second. Meanwhile, Kinwald made his way from the back of the pack and was riding where the action was—in third place. Several strategically timed crashes drastically mixed up the running order. Easton was still in the lead, and Kinwald was in second. Tavakoli, who also rode in second for a short while, settled into third, and that's how they finished.

**A3-Main.** Going into the last round, Brian Kinwald was ahead in points, but a win for Billy Easton or Matt Francis would put either into the winners' circle. Kinwald didn't take any chances in this round because he shot out in front and immediately gained plenty of ground on the rest of the field. The battle for second was between Jim Gard and Easton. After a couple of laps and a couple of position changes, Jimmy Jacobson found himself in second, while Easton settled into third and Gard into fourth.

Easton got caught on a pipe on two occasions, and those sent him back to fourth, while Jacobson found himself in eighth after making a costly mistake. At the sound of the tone, Kinwald crossed the line with half a lap lead on his nearest competitor. Brent Thielke came from nowhere to claim second, and Francis finished in third. After the points had been tallied, Kinwald was declared the overall champion, Easton picked up second and Francis third.

### TRUCK MODIFIED

**A1-Main.** TQ Greg Hodapp got the holeshot, but Brian Kinwald and Billy Easton made it around the first corner and into the infield just as quickly. Soon, Kinwald got around Hodapp to take the lead, but it didn't take long for Easton to

find his way past Hodapp as he continued his pursuit with Kinwald. A couple of blunders put Hodapp back in fourth and Billy Caley in third. Easton couldn't catch Kinwald in time and had to settle for second, while Caley remained in third. Of course, Kinwald won the race.

**A2-Main.** Jimmy Jacobson broke his truck while he was warming up and made the rest of the drivers wait while one of his teammates fixed his truck. After the delay, the race was off and Gregg Hodapp got the holeshot, while Brian Kinwald and Billy Easton followed closely behind. Going through one of the corners, Hodapp let Kinwald sneak by, and Hodapp was close behind. Meanwhile, Easton was all over the "Gold Dust Twins" and was looking for opportunity to knock. Unfortunately for Easton, that opportunity never came, and he ended up in third. Hodapp secured second, and Kinwald claimed first to win the race and the overall championship. All three drivers finished with less than 1/10 second between them.

**A3-Main.** Kinwald had already secured the championship, so he sat the race out and watched as his teammate Greg Hodapp took the holeshot and never looked back. By the end of the race, Hodapp had a cool 10-second lead on his nearest competitor, Jimmy Jacobson, and Billy Easton took third. Kinwald had already claimed the victory and after the points had been totaled, Hodapp took the second-place honors for Team Trinity, and Easton had to settle for third.

### 4WD MODIFIED

**A1-Main.** Team Trinity/Team Losi driver and TQ Matt Francis shot out in a blaze of glory and never looked back. Just when it looked as if he would easily win the race, he dove into the front sweeper too soon, ripped the left front suspension arm off his car and was out of the race. Meanwhile, Trinity driver Greg Hodapp took over the lead, and Team Orion's Jimmy Jacobson tucked into second. Brian Kinwald rode it out in third, but when the tone sounded, he was in second behind his teammate Hodapp, and

Jacobson was in third.

**A2-Main.** Matt Francis once again got the holeshot with Brian Kinwald, Jeremy Kortz and Brian Dunbar following in that order. Francis and Kinwald started to distance themselves from the rest of the pack, but the battle for third continued. It soon became clear that Francis wasn't going to make any mistakes in this round; he easily won with a 3-second margin over second-place Kinwald, and Dunbar won the battle for third.

**A3-Main.** Believe it or not, going into the third—and final—round, Kinwald was ahead on points with his two second-place finishes, although a win for Francis or Hodapp would clinch the title for one of them. Francis, Kinwald and Hodapp left the grid in that order, and the three Team Trinity drivers fought it out ferociously. Soon, Francis and Kinwald pulled away from the rest and battled it out for first.

As far as Team Trinity was concerned, the win was theirs, regardless of who finished first. This was because Trinity's Kinwald and Francis put on quite a show and crossed the line side by side. The lap computer gave the win to Kinwald, who secured his third Cactus Classic Championship title of the afternoon. After the points had been tallied, Francis was in second place and Hodapp was in third.

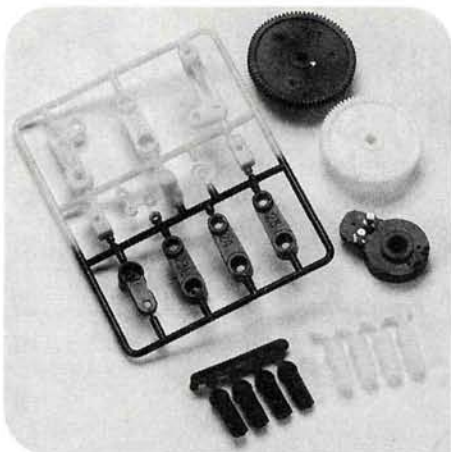
### FINAL THOUGHTS

The 13th annual Cactus Classic was fun and exciting for all those who were lucky enough to attend. The weather was awesome, and the staff at Scottsdale R/C Speedway did a fantastic job of hosting the weekend. We congratulate the winners and send out a special salute to Team Trinity factory driver Brian Kinwald for his fantastic performance.

Remember, if you're new to the hobby and would like to compete at a large, organized event, be sure to travel to Scottsdale next spring. I hope to see you there in 2000.

*\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.*





**Compare the undyed parts with their colored counterparts; even in black and white, they look better! There's no shortage of stuff to dye. You can color-code your gears, add life to boring ol' servo-savers, match your rod ends to your anodized hardware ....**

could use a coffee can placed in a "good" pot, but the best bet is to buy a cheap pot to use just for dye. To easily remove small parts from the dye, just string them like an R/C necklace on a length of twine. Ever wonder what to do with those chopsticks you get with Chinese take-out or sushi? If you can't eat with them, balance them across the top of the pot and hang the small-parts string from them; use them to stir the dye, too. When you've finished—toss 'em!

You will need a heat source—typically the kitchen stove. I have been banned from the kitchen after spilling black dye on the stove and floor, so I use a hot plate in the workshop!

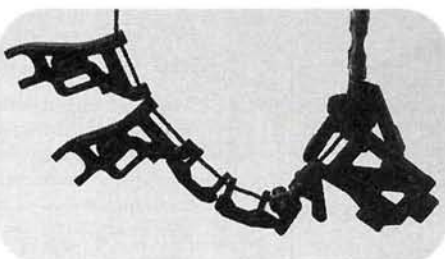
Start by getting your parts ready. Make sure they are clean and free of grease, oil and other contaminants. Tie the small parts together with a loose loop so that they move freely and the dye can get between each part. The string should be long enough to hang from the chopsticks that

will rest across the top of the pot. For smaller parts and those you can't string together, use the "foot" of an old pair of pantyhose to make a bag (you have pantyhose in your toolbox, right? Uh, me neither). Put the small parts in the nylon "bag," and tie a knot on the end to prevent them from floating out.

### IN THE MIX

Next, prepare the dye/water mixture in a pot or coffee can. For liquid black, use 2 to 4 ounces of dye to 3 or 4 cups of water. With powder black, use about 1/2 to a full tablespoon to 3 or 4 cups of water.

For any other color, start with about half as much dye or less. Test the color on a small part first. The more dye you use, the darker the color will be; and the longer you leave the part in the dye, the darker the color will be. Set the burner on "high," stir the mixture while you bring it to a boil, then reduce the heat to "medium high."



**Voilà! Instant black parts (or blue, or red, or ...). If you're working in the kitchen, be on the lookout for drips and keep a paper towel handy.**

### TAKE THE PLUNGE

Ease the nylon parts into the dye carefully—don't splash. When you submerge large parts such as wheels and battery trays, don't let any air bubbles accumulate

## DO'S AND DON'TS

- Don't fill the pan right up to the brim with dye. To avoid spills, use as little liquid as necessary in the deepest pan available.
- Don't put paper towels around the dye pot to catch spills; the paper could easily catch fire.
- Whenever you use dye, wear an apron or old clothes. If you get a drop of dye on your clothes, it ain't gonna wash out—no sir.
- Keep a damp sponge handy to mop up any drips. Act quickly; fabric dye is designed to stain! If any drips leave stains on a countertop, liquid cleansers with bleach can remove them effectively.
- Unless you live in a swingin' bachelor pad (yeah, baby!), get permission from your mom, girlfriend, wife, roommate or whomever before you commandeer the stove. If at all possible, restrict the dyeing to a hot plate in the workshop.

because they cause uneven coloring. When you use black dye, leave the part in for about 5 minutes. With any other color, especially if you wish to keep it light, check



**Pat the parts dry with a paper towel, and use a pipe cleaner or cotton swab to dry out hinge pin holes and any nooks and crannies.**

the parts within the first 30 seconds. Check the small parts by pulling up the string. Use chopsticks, tongs or pliers to remove and check the large parts. When they're the desired hue, carefully remove them (no splashing!) and rinse immediately in clean water or the color may be uneven.

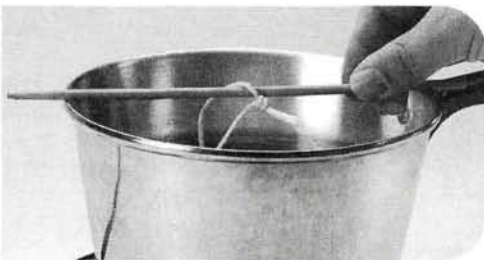
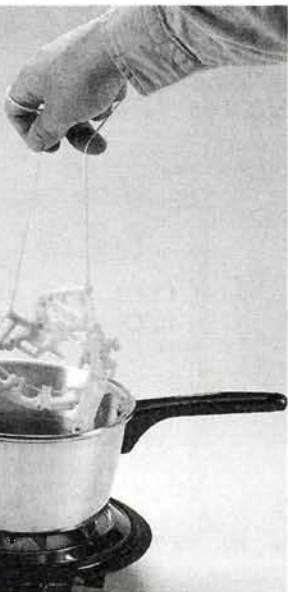
After you've rinsed the parts, dry them with a paper towel. And remember, if you don't like the color of your dyed parts, you can always dye them all black!

### THANKS FOR TUNING IN

Carefully colored parts won't get you on the next pole, but they may score you some extra style points at the pit table and will certainly help your car stand out from the rest.

That concludes this episode of *R/C Car Action's "House of Style"*; stay tuned for the next episode, when Cindy, Vendela and I will review which hair-sprays and suntan lotions work best as traction compounds! ■

**String your parts for easy removal from the dye bath. Here, a batch of Kyosho Pro-X parts gets the lobster treatment.**



**Above: use a chopstick or dowel to keep the string out of the dye. Don't drape the string over the side of the pan, as this could allow it to contact the burner and catch fire. Right: a clear-water bath washes away any excess dye.**





# PRODUCT watch

Need to know what's new? What works well and what doesn't? This section is devoted to objective reviews of all R/C car accessory items. From gears and wrenches to motor brushes and shock springs; if you can use it with your R/C vehicle, you'll find it critiqued on these pages.



**182**  
GM Pinnacle  
Stock Motors



**184**  
Hammad Ghuman  
VLT shocks



**186**  
Deans Speed Jig



**188**  
A-Main Racing  
RC10GT Chassis



**190**  
Keyence A-01  
Professional ESC

## GM RACING Pinnacle Stock Motors REBUILDABLE STOCKERS

Since we first glimpsed a rebuildable stock motor in October '98, many other motor manufacturers and tuners have signed on to the concept by introducing their own versions of these next-generation stockers. GM Racing\* also answered the call with its new line of Pinnacle stock motors:

- Pinnacle Gold—rebuildable;
- Pinnacle Stock;
- Pinnacle Pro.

Sagami, the same manufacturer as builds the Yokomo/Reedy motors also builds the Pinnacle stock-class motors, but to GM's specs. Beyond a few minute telltale signs, however, there are few similarities between the Yokomo and GM motors.

The Pinnacles feature a new 1.4mm can that has 10 more vent holes, including side vents for better cooling. In the Gold version, the side vents also act as windows through which the armature's (arm) identification tag may be inspected. Though the vents are narrow, you can see through well enough to inspect the arm. At the can's top edge there's a notch (roughly 2mm) that's indexed to a tab on the endbell to lock the timing. As an additional safeguard against tampering, a zero-degree mark stamped in the can is supposed to line up with a notch in the endbell. Unfortunately, the only notch in the Pinnacle Gold's endbell that's even close to the zero-degree mark in the can is about 1mm away from it.

Much like those in the Reedy Rage, the Pinnacles' magnets are a little higher in the can than is usual to allow the arm to be centered in the motor's magnetic field. In older stock motors, the magnets are deeper in the can; this simplifies production because the armature will always be pulled firmly against the bottom of the can by the lower magnetic field. Under these conditions, you need just one thin shim on the bottom of the arm, and the other shims may be installed more easily on the more accessible endbell end of the motor. In the samples we tested, GM hadn't properly shimmed the arms, but it can be done. To what extent proper shimming increases the motor's performance is unclear, but it certainly reduces friction, and that increases power output.

The Pinnacles' composite endbell features gold, electroplated, laydown brush hoods that sit atop purple-anodized brush-hood heat sinks. There's more of the purple heat-sink stuff on the screws



that affix the brush shunts to the endbell (hey, every little bit helps!). The endbell's only new feature is that it now includes brush stabilizers that apply slight pressure to the bottom of the brush to minimize bounce and vibration at high rpm.

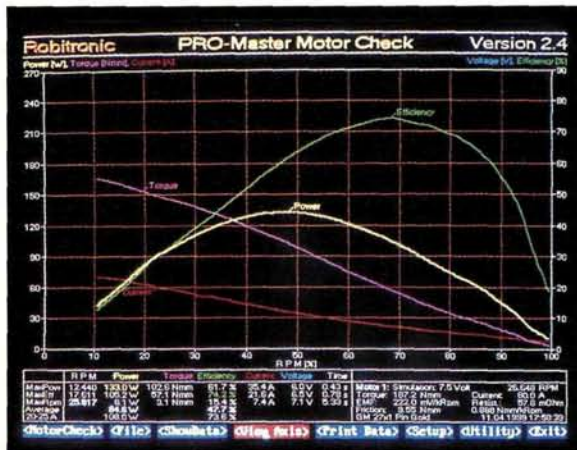
The standard, double-rotor armature design has none of the trick stuff seen on the Rage and Paradox arms: no special drilled holes; no cuts in the poles' crowns—just a plain ol' double-rotor arm with a 0.300-inch-diameter comm and a comm-locking device. In the rebuildable Pinnacle Gold, the arm also has the requisite tapered shaft and an identifying tag epoxied between two of the crowns; other than that, it's pretty standard fare.

### SETTING UP THE PINNACLE

GM Racing will supply ROAR with one of these motors (which version still isn't clear) as a handout motor at all 1999 national-level stock-class events. Everyone is interested to see how these motors will perform at ROAR events—and on local tracks, after the big event.

I tested the Pro and the rebuildable Gold on a Robitronic Pro Master dyno—first right out of the box then using different brush and spring combinations.

Their power numbers—in the 120- to 125W range—were respectable, and torque was very good, but the motors were a little low on the revs. In fact, an "untouched" Pinnacle



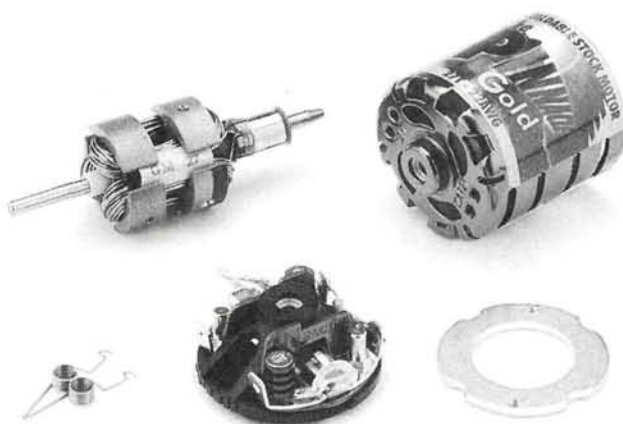
**The Pinnacle Gold produces a very respectable 133 watts of power and a strong 102.6 Nmm of torque at the peak power rating.**



generates very good numbers in all aspects of performance except the rpm readings.

I next experimented with brush and spring combinations in an attempt to maximize performance. The Gold and Pro versions' standard, full-face serrated brushes resemble Reedy's 767 brush and generate good overall power, but they also contributed to the minor rev shortfall. To remedy this, I switched to a pair of Trinity no. 4070NT brushes—serrated silver with a slot cut down the center—and went back to the stock 0.55mm springs that are next to the heaviest in the GM line. The Pinnacle then developed 133 watts of power (1 watt higher than anything I've ever seen), and picked up 700rpm and 10 Nmm of torque at maximum power (see photo of dyno screen). Torque at max power is also the highest I've seen—though by only a hair-splitting margin.

The Pinnacle Gold's performance characteristics are strikingly similar to those of Trinity's Paradox and Midnight 2—so similar that you could install the Pinnacle and stay with the same gear ratio as you used with them or with any other stock motor that uses the EPIC rebuildable design. With a slight advantage in torque and slightly fewer rpm (only about 120rpm difference between the two at max power), you could possibly go up one tooth on the pinion gear. If you've been running a Rage 24 or a Rage Type-R, you'll have to change gearing. If you switch from a Rage to a Pinnacle, reduce the final drive ratio by approximately 10 percent. For example, a T3 that runs a 10.5:1 final drive ratio should be reduced to a 9.4/9.5:1 ratio. An on-road car that starts with a 5:1 ratio should switch to a 4.5:1. Whatever your final ratio, multiply it by 0.9, and that should get



**The Pinnacle features a standard double rotor armature and a new can that includes 10 additional cooling holes. Note the tapered shaft and armature identification tag.**

you in the ballpark.

The final analysis is that the new Pinnacle motors outshine GM Racing's previous offerings by a long shot and can now run with the best available current stock motors. By the slightest margin, they produce the best maximum performance numbers. In the meat of the performance window for a stock motor (20 to 25 amps), they drop a fraction below the Paradox's best ever rating, but they're entirely capable of keeping pace.

—Steve Pond

## HAMMAD GHUMAN

### VLT Shocks

#### See-through system

If you're someone who constantly looks for new ways to make your car more durable or quicker and easier to tune, then you probably already have some Hammad Ghuman\* (HG) parts on your car. I use HG's super-light alloy drive shafts on my Nitro RS-4 for quick-



er acceleration and HG's hex hub on my RC10GT for durability. The newest HG product to make its way onto one of my racing vehicles is the Clear VLT (very low turbulence) Shock, which is very easy to maintain and provides smooth damping; let's check it out.

I picked up a set of these clear wonders for my Nitro RS4. When I looked them over, it was apparent that they were perfect replicas of the original body's, only machined

from Lexan. Their smooth finish instantly tells you that these dampers will perform well. My next task was to build four and bolt them to a car.

To ensure a perfect seal, the O-rings fit inside the bodies with a slight resistance. I filled them with oil, released the trapped air, slipped the bladder in and capped them off. I pushed the shock shaft up and down rapidly and saw no evidence of air entering the shock body from either end; HG has truly done some superior machining on this product.

I bolted four of them to my Nitro RS4 and then took it out for a spin. Did I notice a difference in performance? The answer is "No." Although the shocks felt nice and smooth during bench-testing, you really can't tell the difference on the track.

When you use these shocks, the big benefit is evident in setup and maintenance. If you can't remember the weight of the oil you run



in your shocks, a quick glance will remind you what it is—as long as the oil is color-coded. Maintenance, too, is easier; you can see when the oil is dirty. A common problem in racing arises when the shocks feel good but begin to leak oil from the seals because dirt has been rubbing against the O-rings.

HG's VLTs are excellent replacement shocks; they work well and are easy to maintain. I recently bolted some Losi-type VLT units onto my Project USA-1 truck, however, and discovered a small problem. When I tightened the cartridge into the body, the end of the body flared. If you pick up a set of Losi VLTs, snug the cartridge down and then tighten it 1/3 turn more. I didn't crack the HG shock body, but I wasn't about to chance it, either.

—Greg Vogel

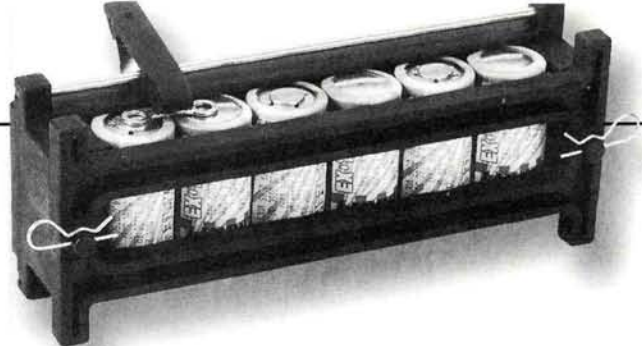
#### Likes

- Clear body makes it easy to inspect oil.
- Precision machined.
- Looks just too cool.

#### Dislikes

- Losi-style units can flare if overtightened (problem has been corrected; new shocks soon to be released).





## DEANS

### Speed Jig

#### Build a pack with just two hands

The past few years have seen several battery jigs come onto the market. They are all handy in their own ways, but they seem to have a common fault: they take too many hands!—one hand to hold the jig, one hand for the iron, one to hold the battery bar and yet another to feed the solder. Maybe if I were of the octopus family, I would find battery building more enjoyable!

Fortunately, the innovators at Deans\* have come to the rescue with their new Speed Jig, which promises to do everything but solder. Its unique clamping mechanism holds the battery bars in place for you; Deans claims that, with the Speed Jig, you'll be able to build packs using just two hands!

I eagerly awaited the chance to put Deans' claim to the test. It is molded from a strong and rigid polymer that seems to be very durable, and after doing some simple assembling of the

battery-bar hold-down clamp, I was ready to begin building my pack. Consisting of a single leaf spring and a plastic clamp, the mechanism that holds the battery bars in place is nothing short of ingenious. The jig clamps 6 cells very securely with two body clips, and allows easy access to the ends of the cells for soldering. Simply flip the entire jig over to access the opposite ends of the cells; once you've clamped the cells in the jig, you don't have to remove them until you've completely assembled the pack.

Although the jig is very easy to use—nearly foolproof—Deans suggests caution when you heat the battery bar. If the bar gets too hot, it could damage the jig's plastic clamp. If you don't hold your iron to the bar for more

than five seconds at a time, you should be fine. In fact, this will only be a problem if you use a soldering iron that's too small or under-powered. Both types produce less heat and therefore have to be in contact with the bar longer; this could heat up the bar and melt the clamp. To facilitate soldering and enhance your pack's performance, before you apply the solder, tweak the ends of the battery bars to make

them lie perfectly flat on the ends of the cells.

The folks at Deans have really done their homework with the Speed Jig; it lives up to its name. I built a pack about three times faster than with the other jigs I've tried, and it was easy to get professional-looking results.

—Chuck Martin

#### Likes

- Easy to set up and use.
- Allows fast assembly of battery cells.
- Durable construction.

#### Dislikes

- None, as long as you use an appropriate soldering iron.

# ON ROAD ELECTRIC NATIONALS

Sanction # RN-99-06

## Aug. 20,21,22 1999

Hosted By

### RIPON R/C SPEEDWAY

[www.riponspeedway.com](http://www.riponspeedway.com)

1/12 SCALE STOCK 1/12 SCALE MOD

1/10 SCALE STOCK 1/10 SCALE MOD

TOURING CAR STOCK TOURING CAR MOD

Stock Class Will Be Handout Motors

Additional Motors \$17 available at the track

#### SCHEDULE

Fri. Aug. 20 2 Rounds of Qualifying

Sat. Aug. 21 2 Rounds of Qualifying  
Conquers Competition

Sun. Aug. 22 All Mains with  
Triple A-Mains

STOCK \$55 first entry \$50 for additional  
MOD \$45 first entry \$40 for additional  
Entry limit of 250 or 25 Heats

#### ENTRY FORM - FULL ROAR MEMBERSHIP REQUIRED

NAME	PHONE	T-SHIRT SIZE
ADDRESS	CITY	STATE ZIP
CLASS 1	FREQ 1	FREQ 2 FREQ 3
CLASS 2	FREQ 1	FREQ 2 FREQ 3
CLASS 3	FREQ 1	FREQ 2 FREQ 3

Drivers May Enter Either Stock or Mod. in any Type Car - But Not Both  
Make Checks Payable To Ripon R/C Speedway 701 N. Acacia Ave Ripon, Ca. 95366

Sorry no phone in or e-mail entries. Free t-shirt with entries received by Aug. 6th. Entrants will receive conformation by mail with hotel info and a complete schedule of events.

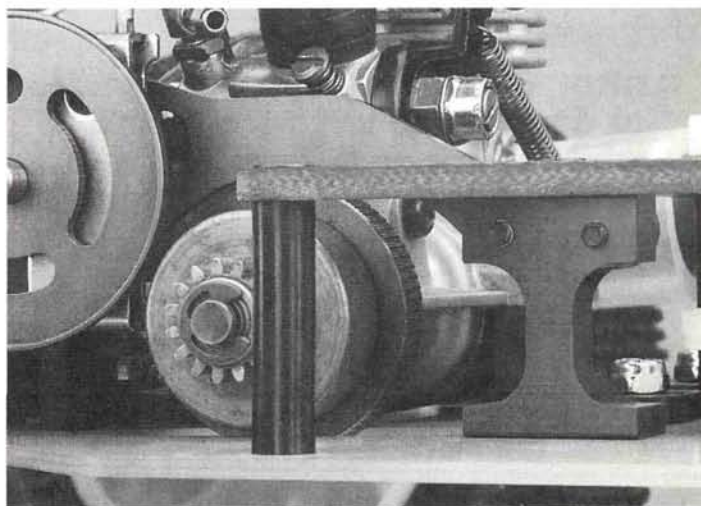


## A-MAIN RACING PRODUCTS RC10GT Racing Chassis Get Stiffed

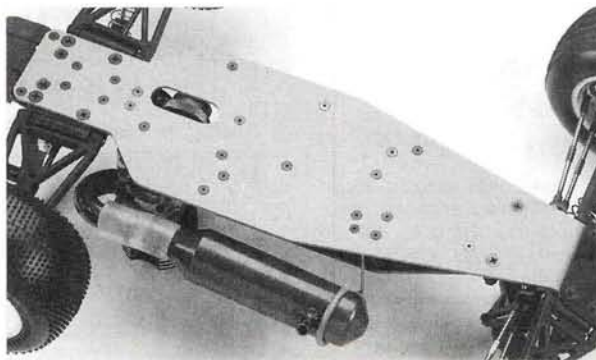
Let's face it: chassis are the least often replaced item on any R/C vehicle. The stock chassis that comes with most kits is a stable platform, but some allow torsional or front-to-back flexing that can lead to erratic handling. Associated's RC10GT's aluminum tub is one such platform; although chassis failures aren't a problem, for optimal performance, the GT could stand stiffening in the engine-mount area. A-Main Racing Products\*, a company with a long history in the gas truck segment, has remedied the problem by machining an entirely new chassis. We built up a GT with the new chassis to see how well it would hold up.

A-Main didn't fool around when it made this chassis set. The lower aluminum plate is 2mm thick and hard-anodized for durability. Unless you slam-dunk your truck on a rock, it will take a long time to scratch the chassis. Each hole is drilled and countersunk, but there is no hole for the tuned pipe support. It's possible to rebend the stock wire and bolt it to the top plate, but I decided to drill and countersink a hole in the chassis. The top plate is 3mm-thick fiberglass and is supported by plastic posts.

As previously noted, the stock GT chassis flexes around the engine mounts. This is drastically reduced on the A-Main chassis. An aluminum T-shaped post just in front of the engine and next to the fly-wheel connects the chassis and upper deck. An arch-shaped brace links the T-post and the transmission case. This reduces the front-to-back flexing in this area, but there's still some torsional flexing if you (literally) force the issue. The aluminum tubes that support the nose of the stock GT chassis are not used; instead, small aluminum wedges are bolted to the shock tower



*I left the spur gear off to give you a better view of the brace that passes over the clutch bell to eliminate front-to-back flexing in the engine area. The back of the brace is bolted to the gear case.*



*As you can see, the holes on the bottom of the chassis are countersunk; the hard anodizing resists scratching.*

and top deck. You'll need to drill new holes in the tower for the mounts; take a little extra time when marking where to drill.

New engine mounts are also provided. These lightweight units are fully adjustable via two slotted holes in the front mount and one in the rear. You may think bolting down the engine with three screws and locknuts is a little sketchy, but trust me, the engine isn't going anywhere. To top it all off, all of the aluminum braces and engine mounts are anodized in a deep blue finish.

Besides drilling the aforementioned holes in their respective areas, the chassis assembly is simple, and the end result is a clean, trick-looking platform. Because a front bumper isn't included, I picked up an RPM front bumper (part no. 7072). The stock chassis with parts that will be replaced by the A-Main chassis weighs 7.78 ounces, while the A-Main unit with supplied replacement parts weighs 7.68 ounces.

On the track, the truck feels a little more sure-footed, perhaps due to the reduced flexing in the engine area and the thicker, hard-coated chassis material. If you're looking to replace your existing or worn-out chassis, you'll want to consider A-Main's replacement unit.

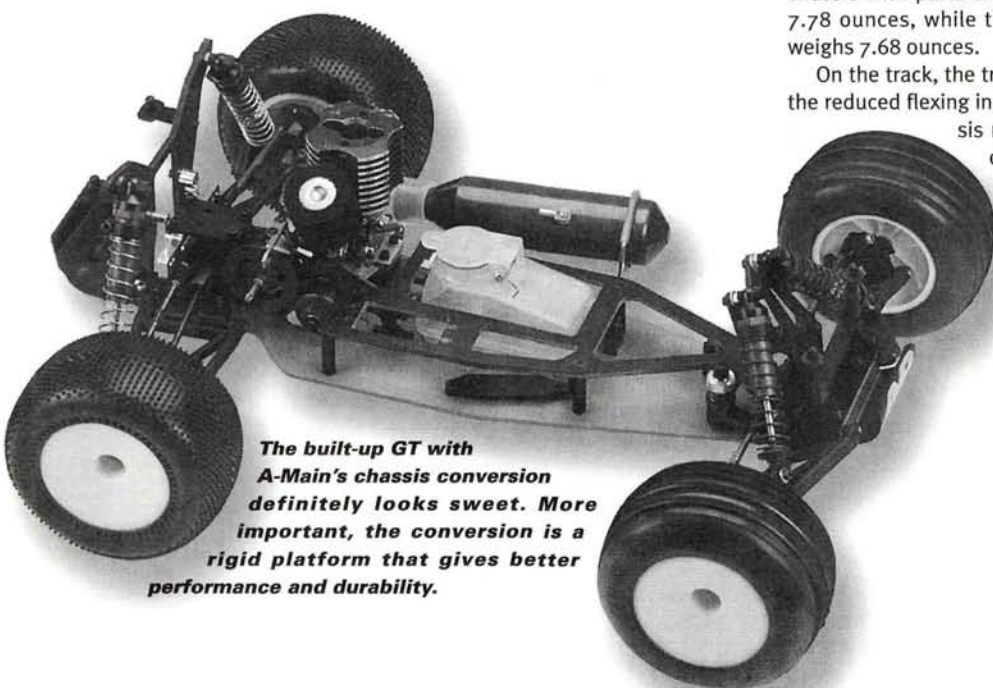
—Greg Vogel

### Likes

- Hard-anodized, thick aluminum.
- Blue aluminum braces.
- Minimal chassis flexing.

### Dislikes

- No hole for the stock pipe mount.
- Installation requires new holes to be drilled in the front shock tower.



*The built-up GT with A-Main's chassis conversion definitely looks sweet. More important, the conversion is a rigid platform that gives better performance and durability.*





## KEYENCE

# A-01 Professional ESC

### MANUFACTURER'S SPECIFICATIONS

**Input voltage**—4-8 cells  
**On-resistance**—0.00085 ohm  
**Dimensions**—1.2x1x0.5 in.  
**Frequency**—2930Hz

"That's it?"

I couldn't help but say just that when I first held the Keyence A-01 Pro. I knew it was tiny from pictures, but when I actually had it in my hand, it seemed impossibly small. Frankly, I didn't expect it to work in the real world; for 1/12-scale stock—OK, maybe; but for use with heavy 1/10 off-landers or touring cars, my expectations of the A-01's performance could have been summed up in one word: poof! I was totally wrong, mind you; but can you blame me? Here's the scoop on this mighty, mini ESC.

### FEATURES

• **Current limiter.** This is standard stuff; a twist of the potentiometer allows you to set the limiter anywhere from zero (which isn't really zero, as that would turn off all current) to 100 percent, which doesn't limit current at all. Keyence's standard A-01 also has a current limiter.

• **Current limiter timer.** This feature is found on the Pro model only. The concept is simple, and it works. The timer can be set from zero to two seconds. The setting determines how long the current limiter will operate after the initial application of throttle. For example, let's say you've set the current limiter at 50 percent, and the timer is set for 1 second. When you squeeze the throttle, the A-01 will limit current to 50 percent. After 1 second, the current limiter switches off—you have 100 percent throttle. Here's the beauty of it: once you brake or return the trigger to neutral, the A-01 resets the timer. This is great for those situations when you need to ease on the power to avoid spinning out when you exit a turn but still need punch for the straightaway.

• **Dash power mode.** This option bypasses the current-limiter setting for the first burst of throttle only then activates your current-limiter setting for the rest of the run. This allows full-power punch at the start tone while maintaining a tamer current-limiter setting for smoother driving and increased run time.

• **Heat sink.** The included "radiating fin" (held on with an adhesive strip) replaces the A-01's faceplate. Since I needed to keep the A-01 label in place for photos, I tested the ESC without the benefit of the heat sink. Life's tough!

• **Protective case.** As impressive as the A-01 Pro's high-tech features are, this low-tech item is my favorite feature. The translucent blue case provides a bit of cushion for the ESC and allows it to be easily transferred to another car (as long as it also has a Keyence case taped to the chassis). I'm always swapping ESCs between test cars

and my personal wheels, so this feature is a real help.

• **Push-button setup.** Does anyone even offer a top-end ESC without this feature? The A-01 sets up quickly and is easily dialed in to your transmitter.

• **Other stuff.** Soft silicone wire is supplied and is soldered to the external mounting lugs at the factory, as is the required high-frequency capacitor. The 12-gauge wire is nice, but the colors are hideous: a weird mango hue for motor negative, hot pink for motor/battery positive and minty green for battery negative. Keyence also includes a plastic tool to press the minuscule setup button, capacitors and Schottky diode.

### PERFORMANCE

I borrowed the G-man's HPI RS4 Pro 2 to test the A-01 Pro, since G had already run the tiny ESC for a while—with a 10 double! George gave me the rundown on his experience with the A-01 ("Dude, it's awesome!"), but I wanted to shake it down myself. First, I tried the A-01 with the current limiter off (100 percent). Needless to say, George's Pro 2 was a rocket

with that 10 double in place, but the throttle was easy to control; the power-band feels very linear; more trigger gives you more throttle—without any unusual ramp-up or flat spots. Next, I dialed in maximum current limiting (zero percent) and watched the Pro 2 crawl away at "full throttle"; unless you race uphill on ice, you'll never need the zero-percent setting! More realistic settings in the 50- to 80-percent range helped me control the car more easily, and even small changes in the setting were discernible. I tried the timer and Dash Power modes, which also worked as advertised. When I used the timer, I found the 2-second delay to be far more than any racer should require; a fraction of a second is plenty, and that's where I set the unit. After burning off a couple of packs with a short break in between, I was surprised to

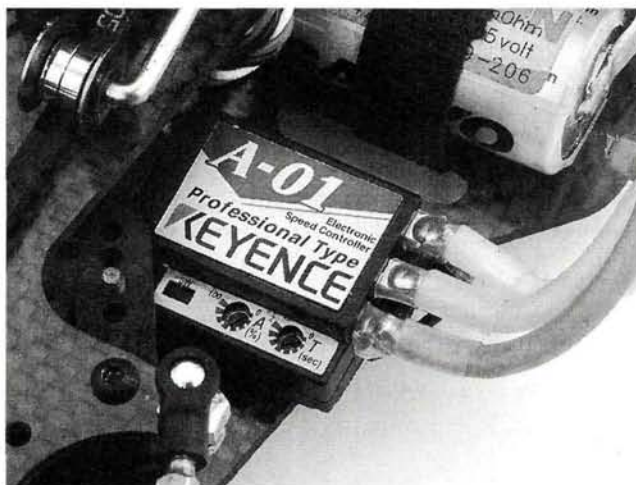
find the A-01 to be merely warm. G-man tells me he's had no heating problems during 4-minute mod heats—good 'nuff.

### IS IT FOR YOU?

There are other ESCs that can do what the A-01 Pro does, but none does it smaller; if your ESC must fit in tight quarters, this is the one to get. Once the "Gee, it's so tiny" novelty wears off, you're left with a fully-featured, reliable ESC with good specs (see the chart). I'm impressed.

—Peter Vieira

\*Addresses are listed alphabetically in the Index of Manufacturers on page 217.



See the battery behind the A-01 Pro? See how big it is compared with the ESC? That's tiny!

#### Likes

- Tiny—fits anywhere.
- Protective case allows easy transfer to other vehicles.
- Easy-to-use timed current limiter.

#### Dislikes

- Hideous wires.
- Difficult to press setup button without a tool.





# Track Directory

FREE! Track owners! You can be included in this directory brought to you by Pro-Line. Just fill out the coupon on page 221.

## YOUR 1999 TRACK GUIDE

### Key to Symbols

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

### ALABAMA

- Beacon Point RC Raceway**, 15717 Beacon Point Drive, Tuscaloosa, AL, 35406; Don, (205) 333-8679
- Hobbytown USA Raceway**, 450-Q Schillinger Rd. N., Mobile, AL 36608; Rob & Karl Baker, (334) 633-8446
- Lagoon Park R/C Raceway**, 2730 Lagoon Park Dr., Montgomery, AL 36109; Alex Love, (334) 272-6438
- Phenix Raceway & Hobby**, 2006 Opelisk Rd., Phenix City, AL 36867; Chris Watson, (334) 298-9786; <http://www.xoom.com/PhenixHobby>
- R/C Hi-Tech Raceway**, 3303 Meridian St., Huntsville, AL 35811; Rick Chambers, (205) 539-1347.
- R/C Thunder Tracks**, 1530 Schillinger Rd., Mobile, AL 36675; for mail, use 8125-2 Moffett Rd., Semmes, AL 36575; Jerry Hurst, (334) 645-2787

### ALASKA

- Fairbanks R/C Car Club** 510 Juneau Ave. Fairbanks, AK 99701; Dan Anderson, (907) 456-5494

### ARIZONA

- HobbyTown Mountain Raceway**, 1500 E. Cedar Ave., Cedar Hills Shopping Center, Flagstaff, AZ 86004; Richard, (520) 214-9887
- HobbyTown Raceway**, 13802 N. Scottsdale Rd., Scottsdale, AZ 85250; (602) 948-3946
- HobbyTown Raceway**, 1915 East Baseline Rd., Gilbert, AZ 95234; Dennis, (602) 892-0405
- Hobbytown Raceway**, 1102 E. 22nd St., Tucson, AZ 85704; (520) 882-8888
- HobbyTown U.S.A.**, 5030 E. Ray Rd., Phoenix, AZ 85044; Linda McFarland, (602) 598-5282
- Kiwanis Park R/C Raceway**, 855 S. Magnolia Ave., Yuma, AZ 85364; Jim Liggett, (520) 539-7148
- Quarter Flash's Squirrel's Dirt Raceway**, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave, (520) 625-9274
- R/C Sports Mania**, 3550 N. 35th Ave., Phoenix, AZ 85017; Brian Dick, (602) 278-3671
- Scottsdale R/C Raceway**, 3023 N. Scottsdale, Scottsdale, AZ 85251; Scott Anfinson, (602) 945-2186
- Speedway Hobbies**, 2710 N. Steve's Blvd., Ste. 8, Flagstaff, AZ 86004; Gary McAllister, (520) 714-1566

### ARKANSAS

- Alison Offroad RC Raceway**, 6320 Thibault Rd., Little Rock, AR 72206; Steve or Coop, (501) 490-1227
- Arkansas R/C Car Association**, 101 W. 52nd St., Little Rock, AR 72118; William Byrd, (501) 753-1286
- Airport Speedway**, 1521 Airport Loop, Rogers, AR, 72756; Mike Dollar, (501) 636-7123
- Grand Slam Superspeedway**, 5300 S. Zero St., Ft. Smith, AR 72901; Bryon Shumate, (501) 648-1994
- Hobby Town USA**, 356 E. Joyce, Fayetteville, AR 72703; Darrell Irvin, (501) 571-3730
- Sparks R.C. Raceway**, 7194 Greene 721 Rd., Paragould, AR 72450; Tommy Sparks, (501) 239-3606

### CALIFORNIA

- Castle Hobbies**, 14918 Camden Ave., San Jose, CA 95124; (408) 377-3771
- Desert Hobbies**, 28-401 Date Palm Dr. Cathedral City, CA 92234; Mike Beall, (760) 320-9442
- Gooch Raceway & Hobbies**, 115C N. Chevy Chase Dr., Glendale, CA 91206; Devin Last (818) 562-2380, fax (818) 242-0525
- Hobby Central Raceway**, 34255 P.C.H., Unit 107, Dana Point, CA 92629; John, (949) 513-0373
- Hobby Central II Raceway**, 13461 Community Road; Poway, CA 92064; John, (619) 513-0373
- HobbyTown**, Parktown Plaza Shopping Center, 1350 S. Park Victoria Dr. #21, Milpitas, CA 95035; (408) 945-6524
- Hobby Warehouse**, 8950 Osage, Sacramento, CA 95828; Roger Hubbard, (916) 381-7587
- Hot Rod Hobbies**, 25845 San Fernando Rd., #21, Saugus, CA 91350; Rod Weisbaum, (805) 255-2404
- Jake's Performance Hobbies**, 6650 Commerce Blvd. #21, Rohnert Park, CA 94928; Jake, (707) 586-3375
- Just for Fun R/C Raceway**, 509 S. State St., Ukiah, CA 95482; Don, (707) 462-7305
- Lucerne Valley Raceway**, 32800 Old Woman Springs Rd. #4, P.O. Box 2047, Lucerne Valley, CA 92356; Frank Rodrigue, (760) 248-7305
- M n M Hobbies**, 4225 Prado Rd., Ste. 103, Corona, CA 91720; Joe Stanovich, (909) 272-3545

- Nor-Cal Mini-Speedway**, 519 Bush St., Woodland, CA 95695; Steve Van Atta, (530) 668-5678
- Racer's Haven Raceway**, 7401 White Lane #12, Bakersfield, CA 93309; Martin Buchannan (805) 835-0441
- Radio Control Products**, 201 E. Magnolia Blvd. #148, Burbank, CA 91502; Tab, (815) 846-4208
- Rams 1/8-scale Gas and 1/16 scale Gas On-Road**, Mission College, Lot B, 3000 Mission College Blvd., Santa Clara, CA 95054-1897; Steve Tsuruda, (415) 675-5609
- Ripon R/C Speedway**, 701 N. Acacia Ave., Ripon, CA 95366; Dan Tanis, (209) 599-5160
- Showtime R/C Speedway**, 3709 Abbott Dr., Bakersfield, CA 93312; Grant or Karen Kniffen (805) 589-0493
- Simi Valley Groundpounders**, 392 C - East Easy St., Simi Valley, CA 93065; Jack Kasten, (805) 584-8211
- So. Cal R/C Raceway**, 19118 Brookhurst St., Huntington Beach, CA 92646; Jim Blauvelt, (714) 963-7484
- Tri-Valley Auto Racers**, Livermore Elks Club, 940 Larkspur, Livermore, CA 94550; Mike Stone, (510) 455-6833
- Ultimate Hobbies**, 2378 North Orange Mall, Orange, CA 92665; Cliff Murukami, (714) 921-0424

### COLORADO

- S&T R/C Raceway**, 323 Auburn Dr., Colorado Springs, CO 80909; Tim Bishop, (719) 574-2910

### CONNECTICUT

- Central CT Auto Racers**, Davis Hobbies II, 45A Welles Street, Glastonbury, CT 06033; (860) 633-3056
- East Lyme R/C Kar Klub**, Society Rd., East Lyme, CT 06333; Howard Estorm (203) 483-9201
- K/N R/C Speedway Inc.**, West St., Stafford Springs, CT 06076; for mail, 44 Clearview Rd., Moodus, CT 06069; (860) 684-9896
- Racing and Entertainment Center**, 29 Olcott St., Manchester, CT 06040; Peter Tierinni, (860) 643-4768
- R/C Madness**, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (860) 741-6501
- Xtreme Radio Control**, 469 Danbury Rd., New Milford, CT 06776; Paul or Pete, (860) 354-4703

### DELAWARE

- The Hobby Outlet: Tracks of the Outlet**, Salisbury Rd., Dover, DE 19901; Steve, (302) 697-8350
- Hobby Stop Speedway**, RD4, Box 100, Rte. 13, Seaford, DE 19973; Remy Haynes, Jr., (302) 629-3944

### FLORIDA

- Broward County R/C Race Club**, Mills Pond Park, Ft. Lauderdale, FL; Ed Decembero, (954) 525-3304
- Burton's R/C Raceway**, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (941) 665-1322
- Coral Springs Roadrunners**, P.O. Box 9632, Coral Springs, FL 33075; John Argentino, (954) 925-8284
- Farmer's Hobby Shop & Raceway**, 5006-3 E. Broadway, Tampa, FL 33619; Greg Cardone, (813) 248-3314
- First Coast Speedway**, 6410 Waltho Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161
- 5-Fifty-5 R/C Raceway**, State Road 555, Bartow, FL 33830; Henry Haacke (941) 533-0539
- Frontier Racx Track**, 15260 N.E. 24th Ave., Salt Springs, FL 32134; Harold Reel, (352) 685-2881
- Gainesville R/C Speedway**, P.O. Box 693, Melrose, FL 32666; 130 NW 14th Ave., Gainesville, FL 32601; (352) 495-3600
- G & C Hobby Raceway**, 1228 Hypoluxo Rd., Lantana, FL 33462; George, (561) 547-3812
- Greater Orlando Auto Racers**, 970 Keller Rd., Altamonte Springs, FL 32714; Rob Michael, (407) 834-9299
- Hobby World Raceway**, 7273 103rd St., Jacksonville, FL, 32210; Greg, (904) 772-9022
- The Hobby Stop Raceway**, 2454 Land O'Lakes Blvd., Land O'Lakes, FL 34639; Rich Konnen, (813) 948-0606
- Minnreg R.C. Club**, 6340 126th Ave. N., Clearwater, FL 34624; David Fox, (813) 787-6032
- Monster Hobbies**, 616 Southeast 10th St., Deerfield Beach, FL 23441; (954) 428-9118
- Morris Kohl's Raceway and Hobby Shop**, 1202 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626

- My Rose**, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (561) 744-3800
- NORRA**, 3300 Santa Barbara Blvd., Naples, FL 33999; Jerry Pecar (941) 455-9065 or Mark Benfield, (941) 263-6861
- Paradise Speedway**, Mile Marker 98.5 U.S. 1, P.O. Box 738, Key Largo, FL, 33037; Paul Surette, (813) 872-8662
- Paul's Stadium Raceway**, 4511 W. Dr. M.L. King Jr. Blvd., Tampa, FL 33614; Paul Surette, (813) 872-8662
- PBG R/C Motor Park**, 6351 Barbara St., Palm Beach Gardens, FL 33418; Doug Gleason, (561) 743-9791 or Tim Case, (561) 627-2608
- Pro Hobbies Speedway**, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615
- Port St. Lucie Racing**, 3626 SW Rivera St., Port St. Lucie, FL 34953; Frank Spadavecchia, (561) 336-8711
- Randy's RC Raceway**, 7744 Glenwood St., Clermont, FL 34711; Randy Zimmer, (352) 242-0557
- River City R/C Car Club**, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948
- Sarasota RC Speedway**, 8475 Cooper Creek Blvd., University Park, FL 34201; Jim Wilson, (941) 358-7047
- Sea Coast Watercraft and Hobby**, 3119 Barrancas Ave., Pensacola, FL 32507; Vic Lakatos, (850) 457-1493



**South Daytona R/C Raceway**, 2121 S. Ridgewood Ave., South Daytona, FL 32119; Mike Bean, (904) 426-6481



**South Palm Beach Racers**, South County Regional Park, West Boca Raton, FL 33486; Mike Fazio, (561) 338-5367



**Superior Hobbies R/C Parking Lot Racing**, 430 E. Hwy. 436, Ste. #106, Casselberry, FL 32707; Rob Michael, (407) 834-9299



**Tallahassee R.C. Raceway**, Tom Brown Park, Easterwood Dr., Tallahassee, FL 32311; Roland Costine, (904) 671-2814



**Tampa Bay R/C Club**, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744



**Tampa Hobbytown R/C 4 Slot Car Raceway**, 15702 N. Dale Mabry, Tampa, FL 33618; Max and Judy Rosenroth, (813) 968-7233



**Tropical R/C Raceway**, Tropical Park, Miami, FL 33155; Pat Butler, (305) 772-4122



**Warehouse Hobbies**, U.S. Rt. 27 South, Winterset Motel, Sebring, FL 33872; Tony and Pam Castronova; (941) 699-1231

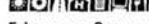


## GEORGIA

**Anthony's Victory Lane**, 129 East Hwy 80, Pooler, GA 31322; Anna Stephens, (912) 748-0847



**Dalton Raceway**, 3036 Parquet Road, Dalton, GA 30720; (706) 226-6699



**Echeconnee Superspeedway**, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson or Cliff Kline, (912) 788-8731



**Emerald City R.C. Speedway**, Highway 40 East, East Dublin, GA 31021; Terry Cook, (912) 272-3856



**The Flight Box Hobby Shop**, 3134-C Rockmart Rd., S.E., Rome, GA 30161-6826; Leslie Duke, (706)-234-3014



**Hobby Town Raceway**, 2301 Airport Thruway, Columbus, GA 31904; Frank Bastos, (706) 660-1793



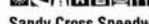
**HobbyTown Raceway**, 225-B Tom Hill, Sr. Blvd., Macon, GA 31210; Marcus Lee, (912) 474-0061



**Lake Mayer Raceway**, 1430 Dale Dr., Savannah, GA 31406; (912) 598-9709



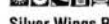
**The Racer's Edge**, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls



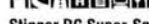
**Sandy Cross Speedway**, Rt. 1, Box 1071, Hwy. 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573



**SHILOH R/C Raceway**, 6362 Shiloh Rd., Hahira, GA 31632; Doug Burnett, (912) 794-2507



**Silver Wings Raceway**, 5611 Riverdale Rd., College Park, GA 30349; M. Bradshaw, (770) 991-2225



**Stinger RC Super Speedway**, 3769 Maysville, Rd., Commerce, GA 30529; Deric Sauls, (706) 335-5006 or (706) 335-9044



**Sugar Bowl R/C Speedway**, 5272 Nelson Brodgon Blvd., Sugar Hill, GA 30518; Shelley Bailey, (770) 945-6709



**Valdosta Hobbies**, 3998 Inner Perimeter Rd., Valdosta, GA 31602; Ron Hood, (912) 244-2101



## HAWAII

**A.S.I. Raceway**, 4516 Akoa Rd., Kapaa, HI 96746; Arnold Morales, (808) 821-8132



**Garden Isle R/C Racers**, 5855 Ahakea St., Kapaa, Hawaii, HI 96746; Arnold Morales, (808) 823-0856



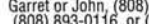
**Kakaako Water Front Park Dragway**, 98-029 Hekaha St., Bay #32, Alea, HI 96701; James Inkyo, (808) 487-5155



**Keahi Lagoon Park**, Leeward Community College, Waipahu, HI 96797; (808) 676-5486



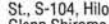
**Maui R/C Racing Association**, 230 Hana Hwy, Unit 11, Kahului, HI 96732; Garrett or John, (808) 873-0376, (808) 893-0116, or (808) 646-6687



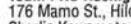
**Pearl City Raceway**, 98-029 Hekaha St., Bay 32, Alea, HI 96701; James Inkyo, (808) 487-5155



**Radio Control Hawaii**, 474 Kalanikoa St., S-104, Hilo, HI 96720; Glenn Shiroma, (808) 935-5629



**Team PRC Racing Club**, 176 Mamo St., Hilo, HI 96720; Charlie Kawamoto, (808) 935-3561



## IDAHO

**Almosta Ranch Speedway**, 1732 Eldridge Ave., Twin Falls, ID 83301; Casey Clements, (208) 733-8219



**Capital Dirt Burners**, 301 N. Bruce, Boise, ID 83712; Mike Ard, (208) 345-3906

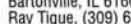


**Dirt Stuff Plus**, 5344 N. Yellowstone Hwy., Idaho Falls, ID 83401; Brian Krah, (208) 522-7576

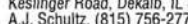


## ILLINOIS

**Adam's R/C Raceway**, 7201 S. Adams, Bartonville, IL 61607; Ray Tighe, (309) 633-9300



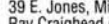
**AJ's Raceway & Hobby**, 10211 Keslinger Road, DeKalb, IL 60115; A.J. Schultz, (815) 756-2772



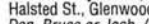
**C.I.R.C.A.**, 905 Bibbs St., Jacksonville, IL 62650; Sport 'n' Hobby, (217) 245-1375



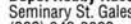
**C&R Hobbies**, 39 E. Jones, Milford, IL 60953; Ray Craighead, (815) 889-4073



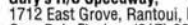
**Dan's Hobby World**, 18415 S. Halsted St., Glenwood, IL 60425; Dan, Bruce or Josh, (708) 754-7988



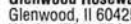
**Depot Hobby Raceway**, 180 S. Seminary St. Galesburg, IL 61401; (309) 342-9323



**Gary's R/C Speedway**, 1712 East Grove, Rantoul, IL 61866; Gary Dale Fleisher, (217) 893-9297



**Glenwood Roseway**, 18417 Halsted, Glenwood, IL 60425; Don's Hobby World, (708) 754-7988



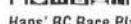
**G&R Raceway & Hobbies**, 533 Bank Lane, Highland, IL 60040; Randy Rose, (847) 432-9600



**H & H Hobbies and Raceway**, 9346 Virginia Rd., Lake in the Hills, IL 60102; Mike Hollingsworth, (847) 458-1777



**Hans' RC Race Place**, 2051 210th St., Atlanta, IL 61723; Hans Bishop, (217) 648-2915



**HobbyTown Raceway**, 2103 N. Verterans Pkwy., Bloomington, IL 61701; Gary Pitts, (309) 664-4451



**Hopkins Hobbies**, 723 South 8th St., Century Plaza, West Dundee, IL 60118; (847) 428-9621



**Leisure Hours R/C Raceway**, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)



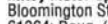
**Machesney Park**, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311



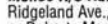
**Marty's R/C Hobby**, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441



**Mitey Motor Speedway**, 1109 N. Bloomington St., Rte. 23, Streator, IL 61364; Doug, (815) 672-4212



**Monee R/C Raceway**, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597 (office)



**Pontoon Raceway**, 3670 St., Rte. 111 Granite City, IL 62040-4304; Pat or Skip, (618) 931-1206



**Outlaw R/C Speedway**, 1614 Broadway, Mattoon, IL 61938; (217) 234-6229



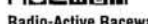
**Quad Cities Radio Raceway**, 541 1st. Ave. North, Silvis, IL 61282; Tom Bedwell, (309) 751-9663



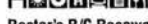
**R/C Workshop**, 3100 S.W. Adams St., Peoria, IL 61605; Al Kretz, (309) 673-4860



**Radio-Active Raceway**, 751 N. Bollingbrook Dr., #15, Bollingbrook, IL 60440; Jim, (630) 759-7557



**Rector's R/C Raceway**, RR 3, Box 104, Albion, IL 62806; Tim Wolfe (618) 842-9379 (M-F), (618) 446-3282 (Sun.)



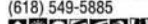
**Shiloh Eagles Superspeedway**, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030



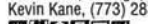
**SIRCAR Raceway**, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885



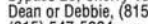
**Stanton Hobby Shop**, 4718 N. Milwaukee, Chicago, IL 60630; Kevin Kane, (773) 283-6446



**Valley Farms R/C Raceway**, 706 Bypass 20, Cherry Valley, IL 61016; Dean or Debbie, (815) 332-4516 or (815) 547-5984



**Wep Speedway**, RR #2, Box 44 Lawrenceville, IL 62439; Bill Poe



## INDIANA

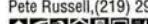
**Bremen Racing Ent.**, 308 N. Bowen, Bremen, IN 46506; Dale Heuberger, (219) 546-3807



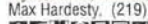
**Elliott's R/C Raceway**, 2140 North Plate, Kokomo, IN 46901; (765) 452-0163



**GM Raceway**, 1651 W. Franklin St., Elkhart, IN 46516; Pete Russell, (219) 293-1827



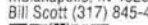
**Hardesty R/C Raceway**, 11 East Plymouth St., Hamlet, IN 4653; Max Hardesty, (219) 867-8600



**Hobby Barn Raceway**, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773



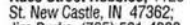
**Hobbytown U.S.A.**, 5385 E. 82nd St., Indianapolis, IN 46250; Bill Scott (317) 845-4106



**P&T Hobbies and Raceway**, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666; email: pntnhobby@bigfoot.com



**Race Street Hobbies**, 1126 1/2 Race St. New Castle, IN 47362; Jim Burke, (765) 521-4888



**Radio Waves Raceway**, 3677 E. CR 400 S., Connersville, IN 47331; Scott Kunkel, (765) 827-5729



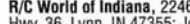
**RC Barn**, 310 N 125 W, Monroe, IN 46772; Mark Lengerich, (219) 692-6600



**R.C.R.C. Raceway of Salina**, 1300 E. Crawford, Bill Burke Park, Salina, KS 67401; Calvin Calp, (913) 823-9588



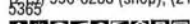
**R/C World of Indiana**, 2246 West U.S. Hwy. 36, Lynn, IN 47355; Joe Kolp, (765) 874-2464; e-mail: rcworld@globalnet.com; web: www.RCWORLD.com



**R/C Mania**, 8 Wood Ct., Hebron, IN 46341; Ron Trobaugh, (219) 996-6288 (shop); (219) 762-5365



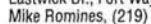
**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



**Showtime Lot Racing**, 5g245g Eastwick Dr., Fort Wayne, IN 46815; Mike Romines, (219) 482-3558



**Summit Area Radio Cars (SARC)**, 7000 Red Haw Dr., Fort Wayne, IN 46805; John Kissel, (219) 492-2271



## IOWA

**Delb's Speedway**, 423 11th Ave. So., Clinton, IA 52732; Rusti's Miniatures and Hobbies, (319) 243-2697



**Dubuque R/C Speedway**, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736



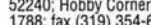
**Hobby Haven**, 7672 Hickman Rd., Des Moines, IA 50322; Rick Marble, (515) 276-8785



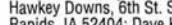
**Inside Challenge**, 2028 Main St., Keokuk, IA 52632; Jessie, (319) 524-2225



**Iowa City R/C Racing Association**, 1700 First Avenue, Iowa City, IA 52240; Hobby Corner; (319) 338-1788; fax (319) 354-6105



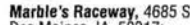
**IROAR—Hawkeye Downs Raceway**, Hawkeye Downs, 6th St. S.W., Cedar Rapids, IA 52404; Dave Kleinschrodt, (319) 556-8524



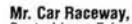
**Manly R/C Club**, Box 23 (Hwy. 65), Manly, IA 50456; Bruce Hill, (515) 454-2025



**Marble's Raceway**, 4685 SE 40 St., Des Moines, IA 50317; Rick Marble, (515) 262-7507



**Mr. Car Raceway**, P.O. Box 1112, Central Iowa Fairgrounds, Marshalltown, IA 50158; Jim Gossett, (515) 483-2234



**Outback Speedway**, 403 State St., Guthrie Center, IA 50115; Helens Enterprises, (515) 747-3064



**Radio Control Raceway Park**, 2100 First Ave. N., Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780



**Riverside Raceway**, Veteran's Park, Algona, IA 50511; Mike Beisch, (515) 295-9352



**Shentona Speedway**, 1215 W. Lowell, Shenandoah, IA 51601; Doug Cross, (712) 246-5984



**Wild Bill's Raceway**, 901 W. Jones, Knoxville, IA 50138; William Anderson, Jr. (515) 842-5973



## KANSAS

**Hobbytown USA**, 2016 W. 23rd, Lawrence, KS 66046; Kevin Decembarus, (913) 865-0883





**Countryside Raceway (portable)**, 406 Pamela Rd., Apt. C, Glen Burnie, MD 21061; M&J's Promotional Entertainment, (410) 761-6196

**Doug's Raceway**, 2935 Crain Hwy., Waldorf, MD 20601; Doug Moran, Jr., (301) 843-6220

**Hobby Town USA**, 8223-11 Elliot Rd., Easton, MD 21601; Bill Dyke, (410) 820-9308

**J.R.'s Race Place**, 2935 Crain Hwy., Waldorf, MD 20601; James Radford, (410) 947-2766

**Outback R/C Race Club**, Maiden Lane., Manchester, MD 21102; Randy or Bonnie Henry, (410) 374-2878

**The Track**, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630

## MASSACHUSETTS

**C&C Hobby & Raceway**, 562 Russells Mills Rd., So. Dartmouth, MA 02748; Charlie, (508) 997-4131

**Hi-Tech Hobbies**, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373

**Megadrome Raceway**, Rt. 8, Curran Hwy, North Adams, MA 01247; Bob Blanchette, (413) 743-7223

**Northboro Speedway**, 168 Main St., Rte. 20, Northboro, MA 01532; Bob Trimble, (508) 393-8087

## MICHIGAN

**D.R. R/C**, 22789 Northline Rd., Taylor, MI 48180; Bobby or Fred, (734) 287-7405

**Freedom Hill R/C Raceway**, 35372 Welston, Sterling Heights, MI 48312; Curley Grewe, (810) 776-5483

**Great Lakes R/C Racer's Club**, 1035 E. State St., Hastings, MI 49058; John Warner, (616) 948-9798

**Hobby Hub**, 5859 M99, Diamonddale, MI 48821; Verne Goebble, (517) 337-9278 or (517) 351-5843

**House of Hobbies**, 2863 West Shore Dr., Holland, MI 49424; (616) 786-3686

**Jon's Hobby**, 4739 E. Pickard, Mt. Pleasant, MI 48858; Jon Beutler, (517) 773-5412

**JT Superspeedway**, W. Golden Ave., Battle Creek, MI, 49015; Jerry or Sam, (616) 965-0116

**Larry's Performance R/C's**, 43665 Utica Rd., Sterling Heights, MI 48314; Larry, (810) 997-4840.

**Lazer RC Speedway**, 2858 N. Wilmoth Hwy., Adrian, MI 49221; Russ Johnson, (517) 263-2806

**MCR Raceway**, 4601 Page Ave., Michigan Center, MI 49203; Sam Sprang, (517) 787-9161

**N.M.R.C.C. Raceway**, Hobby Toy, Main St., Gaylord, MI 49735; Ed Schneider, (517) 732-3963

**Ovatt's R/C Speedshop**, Cheeryland Mall, 1732 S. Garfield Ave., Traverse City, MI 49686; Jim Ovatt, (616) 947-6670

**Raw Roots Race Tracks**, 14623 East Croswell 1/4 mile north on 152nd (off U.S. 31), West Olive, MI 49460; Roy Bennink, (616) 399-9338

**R&L Hobbies & Racing**, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744

**Rodgers R/C Raceway**, 7463 Ridge Rd., Britton, MI 49229; George Rodgers, (517) 451-8301

**Thumb Raceway**, 3441 Main St., Marlette, MI 48453; Jim Wilson, (517) 635-7848

**Vicksburg Off-Road R/C Raceway**, 50201 Silver St., Vicksburg, MI 49097; Tim, (616) 323-7963

**Village Hobbies-n-Crafts**, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374

**Village R/C Raceway**, Prairie Ronde St., Decatur, MI 49045; Chuck Nolke, (616) 423-7878

**Willis Outdoor R/C Racetrack**, 13922 Oakville-Waltz Rd., Willis, MI 48191; Mike Higgins, (734) 587-2012

## MINNESOTA

**Car Town USA**, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248

**Duey's Hobbies & R/C Raceway**, 6600 Cahill Ave., Inver Grove Heights, MN 55076; Duey Carlson, (612) 450-1721

**FunCity**, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365

**Grand Rapids R/C Speedway**, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751

**Granite City R/C Speedway**, 3555 Shadowwood Dr. N.E., East Hwy 23, Sauk Rapids, MN 56379; Brett Donahue, (320) 251-6980

**J's Radio Control Race Park**, 22994 290th Ave., Starbuck, MN 56381; Jay Campbell (320) 239-4827

**Northwoods Hobby Raceway**, 2638 Hwy 25 North, Brainerd, MN 56401; Tom Grogg, (218) 829-9257

**Ray's Raceway Park**, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (320) 634-5246

**R/C Racing World**, 235 Main Ave. North, Harmony, MN 55939; Mark McKay, (507) 886-5931 or (507) 886-2224

**Southside Speedway**, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233

**Time R/C Raceway**, 20 West Lake St., Chisholm, MN 55719; RV, (218) 254-4321

## MISSISSIPPI

**Joe McFadden Hobbies**, 5531 Fox Meadow Dr., Meridian, MS 39307; Joe McFadden, (601) 483-7000

**Small Cars Unlimited**, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST; www.smallcarsunlimited.com

## MISSOURI

**All Seasons Hobby**, 29 O'Fallon Square, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767

**B&L Hobbies & Raceway**, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (573) 431-9444

**Fire Mountain Raceway**, 8647 Commercial Blvd., Pevely, MO 63070; Dan Gordon, (314) 475-6449

**Greentree R/C Racepark**, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-2194

**Hobbies 'N' Stuff Raceway**, 204 Mail Parkway, Wentzville, MO 63385; Tim Satchwill or Crandall Olds (314) 327-6006

**North Missouri Raceway**, 223 Graves St., Chillicothe, MO, 64601; Billy Johnston, (660) 646-1120

**Ozark Mountain Speedway**, Rt. #2 Box 50, H-Highway and County Rd. 31, Noel, MO 64854; Clayton Younker (417) 475-6222

**Ozarks R/C Raceway**, Hwy 13N, Brighton, MO 65781; Gene Rhodes or Ron Hawkins, (417) 742-4376 or (417) 742-7223

**Real Blue Vue Speedway**, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238

**Real R/C Raceway**, 24204 State Rt. 58, Pleasant Hill, MO 64080; Steve Hale, (816) 540-5584

## MONTANA

**Stormer Raceway & Slot Motorplex**, P.O. Box 126 Hwy. 2 East, Glasgow, MT 59230; (406) 228-4569

**Goodyear Speedway and Off-Road**, 4021 North 56th, Lincoln, NE 68510; Tom or Bob, (402) 464-5172

**Hadar R/C Raceway**, 55192 849th Rd., Norfolk, NE 68701; John Schoenauer, (402) 644-7922

**Hobby Town USA Raceway**, N 1st St. & Cornhusker Hwy., Lincoln, NE 68508; Ben Smith, (402) 434-5056

**Mr. Bill's**, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865

**O.N.R.O.A.D.**, 3307 N. 58 St., Omaha, NE 68104; Cook Jacobs, (402) 556-8674

**OTWG Carpet Raceway**, 55129 849th Rd., Norfolk, NE 68701; John Schoenauer, (402) 644-7922

**RC Motorsport Off-Road Raceway**, 5600 Mass Rd., Papillion (Omaha), NE 68133; Marty Stepanek, (402) 593-6133

**Salvation Army South Corps**, 4032 Harrison St., Omaha, NE 68164; (402) 734-3414; fax (402) 734-3415

**T & T Raceway**, 476 26th Ave., Columbus, NE 68601; Tom, (402) 564-9216

**The Speed Zone**, 1524 Atokad Dr., South Sioux City, NE 68776; Rob Murdock, (712) 428-4679, or Jim Carson, (712) 274-7731

**Wacha's R.C. Speedway**, 1823 23rd St., Columbus, NE 68601; Tom Smith, (402) 564-9216

## NEVADA

**Dansey's Indoor R/C & Hobbies**, 741 N. Nellis, Las Vegas, NV; David Lugo, (702) 453-RACE, (888) 675-8963; www.danseys.com

**Lizard Raceway**, P.O. Box 1248, Verdi, NV 89439; Jeff Griffin, (702) 345-6573

## NEW HAMPSHIRE

**Axis Racing R/C Dragway**, 4197 High St., Exeter, NH, 03833; Dan Peterson, (603) 659-4877

**Economy R/C Speedway**, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470

**Robert's Railroad & Hobbies**, 1335 1st NH Turnpike—Rt.4, Northwood, NH 03261; Robert M. Jeffers, Jr., (603) 942-5193

**RT 106 Racepark**, 743 Clough Mill Rd., Pembroke, NH 03275; Fred Farwell, (603) 224-RACE

## NEW JERSEY

**America's Hobby Center Inc.**, 8300 Tonnel Ave., North Bergen, NJ 07047; John Many, (201) 662-0777

**Checkerboard Raceways**, P.O. Box 240, Elwood, NJ 08217; Ray Murray (609) 629-4809

**Family Hobbies Raceway**, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790

**Jackson R/C Racing**, P.O. Box 565, Christopher Columbus Blvd., Jackson, NJ 08527; Al Sodano, (732) 364-6422, or Ed, (732) 928-8963

**Jefferson Speedway**, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525

**Jerry's Hobby Center & Raceway**, 336 Rt. 22W, Greenbrook, NJ 08812; Jerry or Gary, (908) 752-6030

**LBRA Track**, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122

**Millville R/C Oval**, 114 N. High St., Millville, NJ 08332; William Denstoz, (609) 327-4640

**On Trax Hobbies**, 3101 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

**Ray's American Raceway**, 142 Wilson Ave., Englishtown, NJ 07726; Ray Whitehead, (908) 446-3737

**South Jersey Cost Controlled Racing**, 25 Jackson Lane, Sicklerville, NJ 08081; Ray Murray, (609) 629-4809

**The Race Place**, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215

## NEW MEXICO

**Charlie's Hobby Shop**, 225 E. Idaho, Suite 11, Las Cruces, NM 88005; Kim, (505) 541-1097

**Las Cruces R/C Racer's Association**, Meerscheidt Recreation Center, Walnut and Hadley by BMX, Las Cruces, NM 88001; D.J. Clark, (505) 546-4269; email, jade@zianet.com; www.zianet.com/jade/lcraa.htm;

## NEW YORK

**BarnStormers Speedway**, 205 Gray Court Rd., Chester, NY 10918; Lou (914) 469-6468; trackside (914) 469-8206

**Brennan's R/C Hobbies**, 6368 State Rt. 5, Vernon, NY; Bill or Tom Brennan, (315) 829-4930

**Brownie's Pro & Sport Hobbies**, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194

**Bruckner Racing**, 2908 Bruckner Blvd., Bronx, NY 10465 Thomas Baffers Sr., (800)-288-8185

**BSK Hobbies & Raceway**, 120 Main St., Horel, NY 14843; Bruce Harris, (607) 324-4011, (800) 603-0197.

**C&C Speedway**, 570 Conklin Road, Binghamton, NY 13903; Eric Boyd, (607) 773-2044

**C&D Raceway**, 12542 NYS Rte. 12E, Chaumont, NY 13622; Chris or Don Bourquin, (315) 649-5403

**Capital District R/C Racers**, 27 Venus Dr., Albany, NY 12211; Peter Willis, (518) 482-7128

**Chipmunk Hill R/C Speedway**, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065

**East Coast R/C Hobbies**, P.S. 186 School yard, 7601 76th St., Brooklyn, NY 11204, for mail, 2515-65th St., Brooklyn, NY 11204; Brian Cardella, (718) 627-3814

**Foothills R/C Speedway**, 3200 Chestnut St., Oneonta, NY 13820; Dave Osterhoot, (607) 432-5098

**Frogtown Hobbies**, Rt. 37, Mini Pines Village, Hugoburg, NY 13855; Dennis White, (518) 358-3686

**Hacr's Hobbies & Raceways**, 120 Cayuga St., Canal View Mall, Fulton, NY 13069; Jack LaTulip, (315) 598-7063

**Jerry's Raceway**, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940

**Li 1/4-Scale Racers**, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384

**Long Island Raceway**, 168 Broad Hollow, Farmingdale, NY 11735; James, (516) 845-7223

**Performance Plus Radio Control Speedway/The Hobby House**, 1141 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772

**P.R.O. Speedway**, 5 Washington St., Cattaraugus, NY 14719; Marc Pritchard, (716) 257-3101

**Radio Hill Raceway**, 1219 Shannon Corners Rd., Dundee, NY 14837; Bill Brewer, (607) 243-8641, or Greg Areford (607) 243-7899

**Rampage R/C & Hobbies**, 782 Rt. 9G, Rockledge Plaza, Hyde Park, NY 12538; Brian Walker, or Kevin Bobb, (914) 229-1379

**R/C Competition Corner**, 2202 Brewerton Rd., Mattydale, NY 13211; Lori and Cos Cirriello, (315) 455-8718

**Silver State R/C Club**, Centennial Park, Carson City, NY 89501; (702) 853-3953

**Southern Tier Raceway**, 88 Paige St., Owego, NY 13827 Anita Harding, (607) 687-5395

**South Shore Hobby & Raceway**, 464 East Main St., Patchogue, NY 11772; Benny or Bonnie, (516) 758-5567

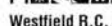
**Tri County Remote Control Car Club**, 33 West Decker St., Johnstown, NY 12095; Tom Leville, (518) 725-1279



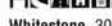
**TARMAC—Ultimate R/C Raceways,** 28/30 Mountain View Rd., Poughkeepsie, NY 12603; Todd (914) 342-5409; Greg (914) 528-5084; tracksides (914) 454-8276; www.tarmacraceway.com



**Walt's Hobby,** 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



**Westfield R.C. Speedway,** 27 Clark St., Westfield, NY 14787; John or Jared Lindstrom, (716) 326-2339; 716-326-2309



**Whitestone,** 30-56 Whitestone Expy. (Dept. of Motor Vehicles), Flushing, NY 11374; Rudolf Ardilla, (718) 966-6155



**ZOAR Road Speedway,** 15318 Armes Ct., Gowanda, NY 14070; David & Gordon Ackler, (716) 532-9463



## NORTH CAROLINA

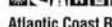
**A&J R/C Models,** 2051 Anthony Rd., Burlington, NC 27215; Jerry Loye or Andrea Thompson, (910) 227-4556; fax (910) 227-1001



**Another Zito's Mobile MASCARR Inc.,** 412 E. Blume St., Landis, NC 28088; Carmen Esposito or Pat Youngerman, (704) 451-3293



**The Antique Barn,** 2810 Forest Hills Rd., Wilson, NC 27893; (919) 237-6778



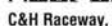
**Atlantic Coast R.C.,** 8-A Lockhead Ct., Greensboro, NC 27409; Charlie Higgins or Harry Johnson (336) 664-1277



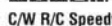
**Badin Shore Raceway,** 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, fax (910) 431-6407



**C/C Hobby Speedway,** 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox, (910) 495-3482



**C&H Raceway,** 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321



**C/W R/C Speedway,** 1297 Charlotte Hwy., Asheville, NC 28730; Billy or Tim, (828) 684-0061



**Carolina Dragway,** 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569



**Chatham R/C Raceway,** 326 Reno Sharpe Store Rd., Bear Creek, NC 27207; Dwight Fields, (919) 898-2991



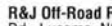
**Green Flag RC Raceway,** 107 Harley Rd., Wilmington, NC 28401; Mike McLemore, (910) 397-0676 or (910) 452-1620



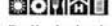
**R & D Speedway,** 418 Main St., Tarboro, NC 27886; John Dupree, (919) 823-2294



**Ride & Slide R/C Raceway,** 5319 Yadin Rd., Fayetteville, NC 28303; Bill Culbertson, (910) 867-4202



**R&J Off-Road Racing,** 6172 Blalock Rd., Lucama, NC 27851; Robert Williams, (919) 239-0853



**Radio Jockey's Parkway, "RJ's,"** Rt. 9, Box 651, Fay, NC 28301; www.wave-net.net/mshutt



**Rosewood R/C Speedway,** 651 Community Dr., Goldsboro, NC 27530; Glenn Elam, (919) 731-4734



**Southern RC Motorsports Club,** Hwy. 17S., P.O. Box 1651, Shallotte, NC 28459; Mark Whitt, (910) 754-4902 or Eddie Ferster, (910) 754-8528



## NORTH DAKOTA

**Hacienda Hills Speedway,** 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419



**Northern Mini Racers,** 1000 36th St. SE, Minot, ND 58702; Mike, (701) 838-5818



**River City R/C,** 2714 Main Ave., Fargo, ND 58103; Chris Hughes, (701) 235-1272



## OHIO

**American Ohio Sprint Car,** 1708 Empire Rd., Wickliffe, OH 44092; Gary Waldhelm, (440) 944-9966



**Classic Hobbies,** 1994 E. Waterloo, Akron, OH 44312; Walt Ellis (330) 733-6400



**CORCAR/Sams Club,** 128 Amity Rd., Gallaway, OH 43119-8732; Bill Stevenson, (614) 870-7159



**Columbus R/C Racing Club (C.R.C.R.C.),** Franklin County Fairgrounds, Hilliard, OH 43026; Jeff Crowell, (614) 236-1783



**D&J R/C Raceway,** 801 W. Market St., Orrville, OH 44667; Rod Yoder or Mark Nussbaum, (330) 682-4266



**Full Throttle Raceway,** 600 Mt. Moriah Dr., Cincinnati, OH 45255; Greg Roshan, (513) 943-9009



**Fun for All Raceway,** 675 College Dr., Batavia, OH 45103; Steve Donaldson, (513) 732-0440



**Glass City Radio Control,** 2620 Ivy Pl., Toledo, OH 43613; Frank Johnson, (419) 472-1286



**Greentown R/C Raceway,** 3353 Perrydale, Greentown, OH 44630; Chuck Lambert, (330) 364-6585



**Hobby Shop Raceway,** 2096 Miami, Centerville Rd., Centerville, OH 45459; The Hobby Shop, (937) 436-6161



**Hobby World,** 3499 SR 59, Ravenna, OH 44266; Tom Fry, fax (330) 296-0894



**Lafferty R/C Raceway,** Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818



**Medina R/C Raceway,** 754 N. Court St., Medina, OH 44256; Bill Ahoit, (216) 723-0255



**Mid American Raceway,** 13150 Airport Hwy., Swanton, OH 43558; Bill or Chuck, (419) 475-9459



**Nothing But Air R/C Track,** 34632 True Rd., Logan, OH 43138; Gary Lloyd, (740) 385-0288



**Scooters Hobby Hut,** 234 Robbins Ave., #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411



**Shiray's Hobby & RC Raceway,** 19930 State Route 117, Waynesfield, OH 45896; Ray Zimmerman, (419) 568-8055



**TARCAR,** 7216 Nebraska Ave., Toledo, OH 43617; Bill Bridges, (419) 826-3859



**Tri-State R/C Auto Racers,** Joyce Park, Hamilton, OH, 45011; Ernie Bauhoffer, (513) 528-2052



**Van Wert R/C Raceway,** 144 E. Main St. (above Hoveman Music), Van Wert, OH 45891; Mark Davis, (419) 232-2112



**Y-City Hobby & Speedway,** 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (674) 455-3025



## OKLAHOMA

**Adams Creek R/C Speedway,** 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416



**Competition R/C,** 100 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809



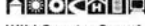
**Coweta Hobby & Speedway,** 310 S. Broadway, Coweta, OK 74429; Deriad Seabolt, (918) 486-3948



**R/C Speedway,** 1401 N. Vanburan, Enid, OK 73701; Sean or Jessica Hillery, (405) 237-5504



**Remote Control Race Course,** 2600 St-35 Serv. Rd., Moore, OK 73124; Rick or Steve, (405) 993-9346



**Wild Country Speedway,** 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686

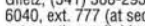


## OREGON

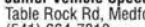
**Competition Racing Association,** 17941 NE Gleason, Portland, OR 97230; Mark Taylor, (503) 761-1334



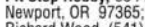
**D.I.R.T. R.O.A.D. Club,** 65540 73rd St., Bend, OR 97701; Daley and Edward Gietz, (541) 388-2932 or 1-800-475-6040, ext. 777 (at second dial tone, enter ext.); email: blue@coinet.com



**Junior Vehicle Speedways,** 3634 Table Rock Rd., Medford, OR 97501; (541) 664-7810



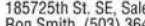
**Pit Stop Hobby,** 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (541) 265-2825



**R/C Craze Speedway,** 300 Ashland Lane, Ashland, OR 97520; Shawn Lazareff, (541) 482-4786



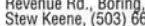
**R/C Plus Hobbies Raceway,** 185725th St. SE, Salem, OR 97302; Ron Smith, (503) 364-9188



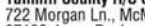
**R/C Speed Center,** 2810 N. Pacific Hwy., Medford, OR 97501; Gene and Betty Jean Skelton, (541) 779-8298



**Rose City Scale Racing,** 8700 S.E. Revenue Rd., Boring, OR 97009; Stew Keene, (503) 663-6509, fax (503) 663-9021

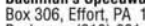


**Yamhill County R/C Car Club,** 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234

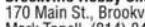


## PENNSYLVANIA

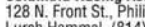
**Bachman's Speedway & Hobbies,** Box 306, Effort, PA 18330-0306; Jeffrey Bachman, (610) 681-5845



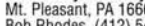
**Brookville Hobby Shop,** 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385



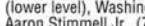
**Columbia Racing Association,** 128 N. Front St., Philipsburg, PA 16866; Lurch Hammal, (814) 342-7114



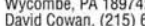
**Cooks Way Raceway,** Cook's Way, Mt. Pleasant, PA 16666; Bob Rhodes, (412) 547-5719



**Courtview Raceway,** 20 S. Main Street (lower level), Washington, PA 15301; Aaron Stimmel Jr., (724) 225-4302



**DC Ultra Trax,** 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200



**Dreamboat Hobbies,** 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052



**Fantasy RC's and Hobby,** 2315 W. 12th St., Erie, PA 16505; Frank Francis, (814) 453-6337



**Hobby America Raceway,** 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765



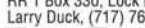
**Koontz's Home & Hobby Center,** 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



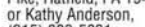
**Kranzel's R/C Raceway & Hobbies,** 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223



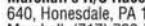
**Little Plum R/C Hobbies,** RR 1 Box 330, Lock Haven, PA 17745; Larry Duck, (717) 769-1984



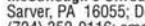
**Lugnut Raceway,** 1713 Bethlehem Pike, Hatfield, PA 19440; Bill Henning or Kathy Anderson, (215) 822-5831



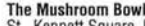
**Marshall's R/C Raceway,** RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



**McCullough's Offroad,** 108 Callen Rd., Sarver, PA 16055; Doug McCullough, (724) 352-0116; email: DMcull623@aol.com



**The Mushroom Bowl,** 960 W. Cypress St., Kennett Square, PA 19348; Bruce or Drew, (610) 444-1850



**Pinion Twisters,** 3M Plant, Green Ln. and Mitchell, Bristol, PA, 19007; Mark, (215) 632-2344 or Tony, (215) 742-3560



**Pit Stop Hobbies,** 262 W. Main St., Mount Joy, PA 17552; James Stoudt Jr., (717) 653-6222



**Prop & Wheels Raceway,** 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288



**The Raceway at River Junction,** 1216 4th St. (behind cemetery), Beaver, PA 15009; (412) 728-5571



**RC Ave. Raceway,** 324 McKinley Ave., Latrobe, PA 15650; Scott Smith, (412) 537-5501



**RC Outfitters RCO Raceway,** 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490



**R/C Pro Speedway,** Millville Rd., Bloomsburg, PA 17815; John Swisher, (717) 387-0266; fax (717) 387-4937



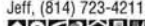
**R/C Pro III,** 910 Chestnut St., Coal Twp. (Shamokin), Shamokin, PA 17866; John Swisher, (717) 648-7763



**Riverside Raceway,** PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211



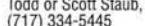
**S.A. Hi Banks,** Hahn's Dairy Rd., Palmerton, PA 18071; Scott Andrews, (610) 826-4583



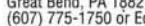
**Staub Bros. R/C Speedway,** 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445



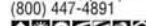
**TnT Raceway,** Randolph Rd., Great Bend, PA 18821; Frenchie, (607) 775-1750 or Ed Kraft, (717) 967-2604



**World A.T.L.A.S./P.A.R.C.E. R/C Raceway Hobby Shop & R/C Club,** Chester Exchange Mall, 10th & Morten St., Chester, PA 19013; Darryl, Lee or Marc, (610) 874-2540



**Trains & Lanes Raceway,** 3825 Northwood Ave., Easton, PA 18045; Jeff Setzer, (610) 253-8850, (800) 447-4891



**Willow Mill Speedway,** 37 N. Season's Dr., Dillsburg, PA 17019; George Verbowitz, (717) 432-4445



**Willow Run R/C Raceway,** 135 Wright St., Corry, PA 16047; Jim Small, (814) 664-8147



**World A.T.L.A.S./P.A.R.C.E. R/C Raceway Hobby Shop & R/C Club,** Chester Exchange Mall, 10th & Morten St., Chester, PA 19013; Darryl, Lee or Marc, (610) 874-2540





## SOUTH DAKOTA

**Action R/C Raceway,**  
107 N. Main, Mitchell, SD 57301;  
(605) 996-6895

**Boomerangs Raceway,**  
105 N. Main, Hartford, SD 57033;  
Ed Smithback, (605) 528-7345

**Dakota Off-Road Racers,**  
2989 W. Br. Co. 12, Aberdeen, SD  
57401; (605) 226-0604

**Goldtrax Raceway,**  
409 E. High, Lead, SD 57754;  
Steve Brown, (605) 584-2355

**K&B Speedway,**  
27283 SD Hwy. #115, Harrisburg, SD  
57032; Mike Kosetlin, (605) 743-2582

**R/C Action Raceway,**  
SE Corner at 484th & Hwy. 38,  
Sioux Falls, SD 57105;  
Brian Cox, (605) 373-0511

## TENNESSEE

**D&M's Downtown Raceway,** 2703 U.S.  
Hwy. 411S, Maryville, TN 37303;  
(423) 681-8919

**Futrell's R/C Hobby Shop,** 1715 Jackson  
Ave., Seymour, TN 37865;  
Dan Futrell, (423) 908-9526

**Hillside R/C Raceway,**  
4194 Oakhill Rd., Dayton, TN 37321;  
John and Rusty Tipton, (423) 775-4739

**Hobby Town USA,**  
2000 Mallory Lane, Franklin, TN 37067;  
Bobby Mills, (615) 771-7441

**Machine-Head Straits,** 938 Grandmere  
Rd., Lawrenceburg, TN 38464; Larry and  
Eliane Sanders, (615) 762-6630

**MSA R/C Racing,** Rt. 12 Box 489 B,  
Crossville, TN 38555; D.R. Findley,  
(931) 456-0027

**TnT Raceway,** 643 Loop Hollow Rd.,  
New Tazewell, TN 37825; Cliff Swett,  
(423) 626-9065 or (423) 869-8942

**W.O.W. Raceway,** 59 Luray Rd.,  
Beech Bluff, TN 38313; Kelly Bean,  
(901) 427-7874; email:  
windxd60@pipeline.com

## TEXAS

**215 Speedway,**  
1814 County Road 215, Abilene, TX  
79602; Clyde Gardner, (915) 673-2351

**B&B R/C Hobbies,** 700 East 4th,  
Big Spring, TX 79720;  
Walter Bumbulis, (915) 263-1790

**Big Mike's R/C Raceway,**  
1405 W. Cotton St. (behind the Locker  
Room), Longview, TX 75604;  
(903) 297-7814

**Comanche Trail RC Park,**  
City Park, Big Spring, TX 79720;  
Allen Nichols, (915) 263-4241

**Discount Hobbies,** 1722A West Anderson  
Loop, Austin, TX 78757;  
Tony Bermudez, (512) 458-2324

**Drycreek Raceway,** 5903 Co.  
Road 2297, Quinlan, TX 75474;  
Micky Alphin, (903) 883-4060

**Eastex Raceway,** 45000 Hwy. 59 N.,  
New Caney, TX 77357;  
Brent Mahaffy, (713) 399-9777

**Fastrack Raceway,**  
301 Edith Drive, El Paso, TX 79924;  
Hector Gonzalez, fax (915) 779-4524

**Finish Line Raceway,** 2775 N. Hwy 360,  
Suite 637, Grand Prairie, TX 75050;  
Steve Manning, (817) 652-3340

**Flip & Spin R/C,** 5957 Jones Rd.,  
Bryan, TX 77807; Garland Crabb,  
(409) 822-7311

**Hal's Hobby Raceway,**  
1440 Bessmer, El Paso, TX 79936;  
(915) 591-2213

**The Hobby Center Raceway,**  
4104 Stan Schluter Loop,  
Ste. 1, Killeen, TX 76543;  
Lawrence Remick, (817) 690-7311

**Hobbycraft Speedway,**  
819 N. Main St., Corsicana, TX  
75110; Keith Hoffman, (903) 872-6761

**Hobbytown USA,** 7676 FM 1960 W.,  
Houston, TX 77070;  
Fred Pfafman, (713) 955-7097

**Hobbytown USA,** 999 E. Basse Rd.,  
Suite 177, San Antonio, TX 78209;  
Joe Sena or Clark Baisdon,  
(210) 829-8697; fax (210) 829-8707

**Indy R/C World,** 220 Saturn Rd.,  
Garland, TX 75041; Steve Webster,  
(214) 271-4844; fax (214) 271-4502

**Issac's Race Track,** 18177 Gulf  
Frwy., Houston, TX 77598;  
Issac Ben-Ezra, (281) 488-8697

**Keyser's Hobbies,** 1643 Texas,  
College Station, TX 77840;  
Bill Bennett, (409) 693-8095

**MBRC Off-Road Raceway,**  
204 D&E Valley Lane, Kennedale, TX  
76133; (817) 292-5055

**Mike's Hobby Shop Superstore and  
Raceway,** 1605 Crescent Circle,  
Carrollton, TX 75006; (972) 242-4930;  
www.mikes hobbyshop.com

**North Houston Speedway,**  
11847 Spears Rd.,  
Houston, TX 77067; Bob or Carol  
Hill, (713) 872-2471

**North Texas 1/2 Scale Association,**  
3905 Sandia, Plano, TX 75023;  
Dean Densmore, (972) 519-0324

**Performance Raceway,**  
1106C Witte Rd., Houston, TX  
77055; Jorge Tabush or Terry  
Schmid, (713) 464-4458

**Rev It Up Raceway Practice Track,**  
3076 Kellar Rd., Smithville, TX  
78957; Rev. Alton T. Edwards,  
(512) 237-5903

**Rick's R/C Raceway,**  
238 Scenic Loop, Boerne, TX 78000;  
Rick, (210) 981-2245  
or Rich, (210) 590-1805

**Rough Country,** 905 Jacksboro  
Hwy., Wichita Falls, TX 76301-5310;  
Robert Kerr, (817) 322-2453

**Star/Car Raceway,** 5802 Patton St.,  
Corpus Christi, TX 78415; Glen  
Stead, (512) 949-8525; Race Hotline,  
(512) 881-6105

**T&T Eagle,** 161 W. Spring Creek  
Pkwy., #601, Plano, TX 75023;  
Tony Welborn, (214) 517-0562

**Terminal Velocity R/C Raceway  
& Supply,** 200 Wallington, Ste. 223,  
El Paso, TX 79902; Rick or Frank,  
(915) 534-9198

**Texas Speedway,** 6707 Chimney  
Rock, Bellaire, TX 77401

**Tiger's Den R/C Speedway,** 702 E.  
Broad St., Mansfield (DFW), TX  
76063; Bob Burns, (817) 477-5513

**T.O. Offroad Raceway,**  
6236 Quail, El Paso, TX 79924;  
Efrén Saenz, (915) 821-7522

**Warehouse Radio Controlled  
Raceway,** 5119 Plains Blvd., Amarillo,  
TX 79101; Craig or Darren Waddell,  
(806) 356-9080

**W.E.S. Hobby Race,**  
980 S. Fourth St., Beaumont, TX 77701;  
Edmond Richards, (409) 839-4929

**Wild Bill's Raceway,** 535 E. Shady  
Grove, Irving, TX 75060; Lynn Morgan  
or Tom Nix, (214) 438-9224

## UTAH

**Intermountain R/C Raceway,**  
8481 W. 2700 S., Magna, UT 84044;  
David Mott, (801) 250-8303

**Payson R/C Raceway,** 955 South  
Main, Payson, UT 84651; Gus Wood,  
(801) 224-3852 and Lasca Wood  
(801) 222-8677

**Vision Hobby,** 352 N. State St., Orem,  
UT 84057; Ken Rice, (801) 226-6226

**WOR R/C Raceway,**  
3170 Brinker Ave., Ogden, UT 84401;  
Brian Worton, (801) 393-2530

## VERMONT

**Barre Town R/C Club,** 14 South Main  
St., Wall St. Complex, Barre, VT  
05641; Russ Tribble or Pete Perreault,  
(802) 888-2860 or (802) 476-9458

**Bradford R/C Racing,**  
Main St., Bradford, VT 05033;  
Seth Bean, (802) 222-9674

**Stoughton Pond Raceway,**  
Stoughton Pond Rd., Perkinsville, VT  
05151; Rick Adams, (802) 263-9321

## VIRGINIA

**Brad's Hobbies,** 1105 Greenville Ave.,  
Staunton, VA 24401;  
Brad, (540) 885-3642

**Brown Brothers Hobbies,** 924 North  
Main Street, Dumfries, VA 22026;  
Joel or Bob Brown, (703) 221-5746

**Cooper's R/C Race Center,**  
4000 Sago Rd. (969), Chatham, VA  
24531; Norris Cooper, (804) 724-7342  
or (804) 724-4182

**DRCW Raceway,** Debbie's RC World,  
2200 Commerce Parkway, Virginia  
Beach, VA 23454;  
Les Modlin, (757) 340-6681

**Gloucester Scale Hobbies,** 2352  
George Washington Memorial  
Highway, Hayes Plaza, Hayes, VA  
23072; Rob Thein, (804) 642-3484

**Hampton RC Speedway,** 1920 E.  
Pembroke Ave., Hampton, VA 23663;  
Steve Long, (757) 723-1884

**Hobby Hangers Speedway,** 14014 D  
Sullyfield Cir., Chantilly, VA 20151;  
Kwang or Billy, (703) 631-8820

**The Hobby House,** 116 Edds Ln.,  
Sterling, VA 20165;  
Oppie, (703) 444-0333

**K & W Hobby and Sports,** 5186 Nine  
Mile Road, Richmond, VA 23223;  
Ross Martin, (804) 737-3904

**KC's Radio Control & Repair,** Rt. 4,  
Box 312, Trents Ferry Rd., Lynchburg,  
VA 24503; Curtis or Kim Wright,  
(804) 384-8596

**Olde Towne Hobby Shoppe,** 9105  
Center St., Manassas, VA 22110;  
Arnie Levine, (703) 369-1197

**Race World Hobbies,** 6102 Lakeside  
Ave., Richmond, VA 23228;  
Larry Boyd, (804) 553-8040

**Thunder Road RC Racing,**  
P.O. Box 1022, Troy, VA 22974-1022;  
James Palmer, (804) 589-8174

**The Tiltyard,** 6994 Tiltyard Drive,  
Dayton, VA 22821; (540) 828-3476  
www.tiltyard.com; tiltyard@rica.net

**Trainlano R/C Racing,** 5661 Shoulders  
Hill Rd., Suffolk, VA 23435;  
Frank Stevens, (757) 488-5454

**Allie's,** 108 South K St., Aberdeen,  
VA 98520; (360) 533-6638

**A-Main Raceway,** 14011 NE 3rd Ct.,  
Vancouver, WA 98685;  
Monty Coleman, (360) 571-8404

**Burien Toyota R/C,** 15025 1st Ave. South,  
Seattle, WA 98148  
Ray Meek, (800) 654-6456

**C&C Raceway,** 266 Lind Ave. NW,  
Revton, WA 98055;  
Charles Lakin, (206) 227-5167

**Cedardale Raceway,** 1673 Cedardale Road,  
Mount Vernon, WA 98273;  
Joe Madonia, (360) 659-0072;  
e-mail: getchell@halcyon.com

**Four Season R/C Racing,**  
2941 Sleater Kinney Rd. NE,  
Olympia, WA 98506; Gary and Sharon  
Brown, (360) 491-2430

**Hannegan Speedway,** 4212 Hannegan  
Rd., Bellingham, WA 98225;  
Dana Hoggarth, (360) 734-4090

**Race City,** 125 E. Main St., Auburn, WA  
98002; Craig Haslebach,  
(253) 939-2515; trackside (253) 939-2515

**Schmidt's Auto Parts,** 10305 Old  
Hwy. 99, Marysville, WA 98271;  
Jon Fallia, (206) 653-8838

**Spokane Indoor Raceway,**  
6422 E. 2nd Ave., Spokane, WA 99212;  
Dave Mapston, (509) 534-2430

**Tacoma R/C Raceway,**  
6305 6th Ave., Tacoma, WA 98406;  
Scott Brown, (206) 565-1935

**Tearor Raceway, Fantasy  
World Toy and Hobby,**  
7901 S. Hosmer, Tacoma, WA 98408;  
Dave Kleinman, (206) 473-6223

**Ultimate R/C Raceway,**  
907 Cole St. #3, Enumclaw, WA 98022;  
Dan Daugherty, (360) 802-2388

**West Coast Hobby & Raceway,** 2239  
Stevens Drive, Richland, WA 99352;  
Darren Shank, (509) 375-4995

**Zep's Hobbies & Raceway,**  
530 Interlake, Moses Lake, WA 98837;  
Steve Ralph, (509) 765-8191

## WEST VIRGINIA

**Burr-Fab Raceway,** 90 Davis St.,  
West Union, WV 26456;  
Mark Travis, (304) 873-2487

**Fulton's R/C Raceway,** 2646 Chapline St.,  
Wheeling, WV 26003;  
James Fulton, (304) 233-5355

**Left Turn Hobbies,** 100 Saco Ln. (by Post  
Office), Glen White, WV 25849;  
Stretch, (304) 255-3930

**Race Zone,** Hopewell Rd., Rt. 8, Box  
343A, Fairmont, WV 26554;  
Joe Clutter, (304) 368-1000

**WVRCA R/C Club,** 142 West Main,  
Bridgeport, WV 26330; D.W. Weed  
Winchester, VA

## WISCONSIN

**ABC R/C Inc & Raceway,** 244 W. Main  
St., Waukesha, WI 53186;  
Dick Mathiesen, (414) 542-1245

**Gary's Hobby Center,** 3701 Durand  
Ave., Racine, WI 53403  
Bill Phalen, (414) 554-8884

**Heart of the Valley R/C Club,** 1330  
Midway Rd., Menasha, WI 54952;  
Bill Morgan, (920) 954-1695

**Hobbytown USA,** 2061 South Koeller,  
Oshkosh, WI 54901; (414) 426-1840

**Hobbytown USA - Revolution,**  
Memorial Mall, 3347 Kohler Memorial  
Drive, #D2, Sheboygan, WI 53081;  
Kenney, (920) 452-0801

**JJ's Dirt Heaven Hobby and Raceway,**  
6028 County Road K, New Frankview,  
WI 54229; dirt heaven@msn.com  
Jeff Jansen, (920) 866-9096

**Mid-West Tri-Clone,**  
3745 Shuster, West Bend, WI 53095;  
Tom Holz, (414) 334-0429

**Pro-Star Racing,** 726 Pine St.,  
Green Bay, WI 54301; Chuck, (920)  
494-1233 or Terry, (920) 469-5566

**Revolution Raceway,** Memorial Mall,  
3347 Kohler Memorial Dr., #D2;  
Sheboygan, WI 53081;  
(920) 452-0801 or (800) 594-9420

**R.J.S./R.C.,** 4920 Hwy 70W,  
Eagle River, WI 54521;  
Randy Stys, (715) 479-2541

**S&N's Tracksides Hobbies and  
Raceway,** 6045 N. Green Bay Ave.,  
Milwaukee, WI 53209;  
Scott Ernst, (414) 351-1910

## WYOMING

**Collectable Creations Off-Road Oval  
Track,** 1790 Dell Range Blvd.,  
Cheyenne, WY 82009;  
Phil Severson, (307) 632-2156

**Wind River R/C Racing Association,**  
113 S. 3rd E., Riverton, WY 82501;  
Bob Belding, (307) 857-2068

**Xtreme Hobbies Raceway,** 2724  
Powder Basin, Gillette, WY 82718;  
Krieg Balls, (307) 682-6077

## ARGENTINA

**Club A. Velez Sarsfield,** Av. J.B. Justo  
9000, C.P. 1408, Buenos Aires;  
Jorge Herrero, 54-01-658-5851

## AUSTRALIA

**A.C.T. Model Car Racing Club,**  
offroad track—Wanniassa Raceway,  
Hyland Place, Wanniassa A.C.T.; indoor  
track—Epic Complex, Northbourne  
Ave., Canberra North A.C.T.;  
Gary Davey, 61-6-2871411

**A.C.T. Remote Control Car Club,**  
Jenke Circuit, Kambah, Australian  
Capital territory; Rob Jorgensen,  
61-2-6231-9925,  
email: sxs@dynamite.com.au

**Aubry R/C Car Club,** Aubry  
Showgrounds, Aubry, NSW 2640;  
Ron Langman, 060-247-128

**Canberra Off-Road Model Car Club,**  
Goyder St., Narrabundah, ACT 2604;  
Graham Brown, 61-6-241-3070



**Carine R/C Model Car Club Inc.,**  
Penistone Reserve, Greenwood,  
Western Australia; David Werner,  
61-418-922-966



**Central Coast ORRC,** EDSAC Sports  
Complex, Bateau Bay, N.S.W. Australia  
2261; Peter J. Knight, 61-43-693-698



**Fast n' Fun,** 250 Potreath Rd., Bellbrae  
West, Torquay, VIC 3228 Australia;  
Stephen Chara (613) 5266 1550 or  
(613) 5266 1556; fax (613) 5266 1556



**Illawarra RCECC,** Croome Sporting  
Complex, Albion Park NSW 2527;  
Mel or Andrew, 042-714-683



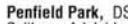
**Lakeside R/C Racing Car Club,**  
Hollywood Dr., Lansvale, NSW 2166;  
R. Bartolozzi, 62-2-907-9800



**Melton Electric Circuit Car  
Association,** Safeway Car Park  
Corner High St. and Coburns Rd.,  
Melton, VIC 3337; Arthur Joslin,  
61-3-9747-8805



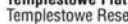
**Northern Districts Model Rally Club,  
Inc.,** Rear Stanford Centre, 16 Stanford  
Way, Malaga, Western Australia 6066;  
G. Thirlwell, 61 (9) 249 3855; fax 61 (9)  
249 4778; email tony@ois.com.au



**Penfield Park,** DSTO Complex  
Salisbury, Adelaide, South Australia  
5108; Trevor Unsworth,  
(618) 8289-5010



**R.C. Speedway,** 259 King St.,  
Newcastle, N.S.W. 2300;  
Andrew Dillon-Smith, 02-49265966



**Templestowe Flat Track Racers,**  
Templestowe Reserve, Corner of Porter  
St. and Williamsons Rd., Templestowe,  
Melbourne, Victoria 31066; Renato  
Benci, 61 (3) 9553 4625

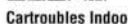


**Wodonga R/C Car Club,** 11 Murphy St.,  
Wodonga, VIC 3690; Ron Langman,  
61-60-247-128

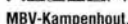


## BELGIUM

**ATR-Alka-Tele-Racing,** 3570  
Stationstraat 21, Alken Limburg;  
0032-11-25-49-03



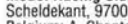
**Cartroubles Indoor Buggy Track,**  
Jan Moonsstraat 52-56, 2160 Wommel-  
gem, Belgium; Guy Ermes, 32-3-326-  
51-15; fax 32-3-326-51-01



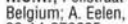
**MBV-Kampenhout,** Teniersen 28,  
Kampenhout B1910, Belgium; Frank  
Mostrey, phone and fax 0-16-65-75-18



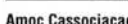
**MRCZ,** Centrum, De Burg, Belgium;  
Montie, 75-71-63



**Model Racing Club Oudenaarde,**  
Scheldekant, 9700 Oudenaarde,  
Belgium; A. Chanterle, 32-55-31-36-48;  
fax 32-55-30-19-12

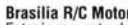


**R.C.R.,** Peilstraat 43, Retie 2470,  
Belgium; A. Eelen, phone and fax  
32-14-379685

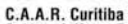


## BRAZIL

**Amoc Cassociacao de Modelismo B.  
Camborio,** Junto ao Par Que Ecologico  
de Bal. Camborio, Bal. Camborio, S.C.  
88.330-000; Leo Cesar, (047) 366-0001



**Brasilia R/C Motor Circuit,**  
Estacionamento do Estadio Mane  
Guariracha, Brasilia, DF 70000, Brazil;  
Alexandre (Alex), 55-061-273-7205



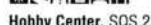
**C.A.A.R. Curitiba Associacao de  
Automodelismo Radiocontrolado,**  
Rua Theodoro Makioka,  
n 2300 Santa Candida, Curitiba,  
PR Brazil, 82650-530;  
Ronaldo Assumpcao, 55-41-354-2804



**Electric Car Club R/C Santos,**  
Av. Bernardino de Campos, 227,  
Santos, SP, Brazil, 11065-001;  
Estevao or Arnaldo, 55-013-232-2536



**Hamilton Neto Associaca RC,** Rua  
Uterere 259, Curitiba, Parana Brazil  
80380-400; Danico Pilhax, 55-41-338-  
8041; hammer\_usa@hotmail.com



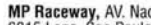
**Hobby Center,** SQS 210 B.H.  
Apt. 204, Brasilia, DF-Brasil 70.273;  
061-242-0488



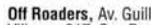
**Hobby Planet Racing Club,** Rod Dom  
Pedro 1, KM 1315, Campinas, Sao  
Paulo, Brasil 13091901; Daniel, Helio,  
Luciano, 019 258 2768



**Jungle Drive,** Rua Alberto Maranhao,  
No. 219 Icha do Gov. Rio de Janeiro,  
21940-490; Paulo Brito  
(021) 396-0851 or (021) 393-7449



**MP Raceway,** AV. Nacoes Unidas,  
6815 Lapa, Sao Paulo; Gerd Heitrotter,  
55-11-9819039;  
www.hpraceway.com.br



**Off Roaders,** Av. Guilherme Dummont  
Villars, 317, Sao Paulo, CEP 05640;  
Waldir Ielpo, (055) 011-260-5628;  
fax (055) 011-831-4931

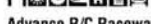


**Way of R/C Off-Road Cerrado,** Rua  
Paraliba 1323, 1st floor, Belo  
Horizonte, Minas Gerais; Claudio T.  
Correa, (031) 227-6111, fax (031)  
227-6869

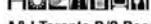


## CANADA

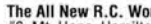
**Action Weelz,** 462 Turcotte, Vanier,  
Quebec, G1M 1R6; Regent Tardif,  
(418) 527-5756



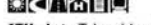
**Advance R/C Raceway,**  
4181 Sheppard Ave. E, Scarborough,  
Ontario M1S 1T3;  
Albert Lau, (446) 321-8377



**A&J Toronto R/C Raceway,** 24 Main  
St., Building B, Unionville, Ontario  
L3R 2E4; (905) 305-1479



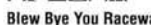
**The All New R.C. World,** 2633 Hwy.  
#6, Mt. Hope, Hamilton, Ontario L0R  
1W0; Dave, (905) 765-2301, Larry,  
(905) 333-3297 or Brian,  
(519) 752-0044



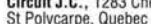
**ATN, Auto Teleguides Nicolet,** 2000  
Rue Paul Hubert, Saint-Jean-Baptiste-  
de-Nicolet, Quebec J3T 1E5; Louis  
Durand, (819) 293-6097



**Auto Sprint,** 6065 Des Grands  
Prairies, St. Leonard, Quebec H3G  
2R6; David Kalayjian, (514) 287-3503



**Blew Bye You Raceway,** 134 Dike Rd.,  
Chilliwack, British Columbia, V2P 5B1;  
(604) 792-8978



**Circuit J.C.,** 1283 Chemin, St. Philipe,  
St Polycarpe, Quebec JOP 1X0;  
Jean Castellon, (514) 265-3675



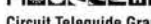
**Circuit Plessis,** Centre de Location, 37  
duRoi, Sorel, Quebec; (514) 746-8828



**Circuit Plessis,** 260 Rang 9 Ouest,  
Plessisville, Quebec G6L-2Y2;  
(819) 362-3743



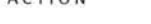
**Circuit R/C Pro,** 1500 Chemin  
Sullivan, Val'd'Or, Quebec; J9P 1M1;  
R/C Modeler Plus, (819) 874-3918



**Circuit Teleguide St. Roch,** 363-B St.  
Charles, St. Roch De L'Achigan,  
Quebec JOK 3H0; (514) 588-4254,  
fax (514) 588-6554



**Circuit Teleguide Grand Prix II,** 701,  
Sainte-Rose, Ste. 200, Laprairie,  
Quebec, J5R 1Z2; (450) 444-1286



**Club Auto Teleguides,** 1750Mlee  
Interprovinc, C.P. 35, Pointe-Fortune,  
Quebec, JOP1NO; Jacques St. Alevis,  
(514) 451-0078



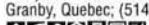
**Club Avall,** 244Jules-Richard,  
Deauville, Quebec J1N 3;  
Daniel Vanier, (819) 864-6262



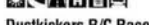
**Club RC51,** 44 Rue Holliday, Sept-Iles,  
Quebec G4R; Sylvio Gerard,  
(418) 968-6575; Hobby Shop,  
(418) 962-6565



**CRCCC,** Box 309, Clinton,  
Ontario N0M 1L0;  
Eric Russell, (519) 482-9429



**CTG,** 450 Chemin de la Grand Ligne,  
Granby, Quebec; (514) 358-4419



**CTL,** 495 Industriel, Longueuil,  
Quebec; (514) 358-4419



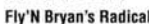
**Dustkickers R/C Raceway,**  
1785 Cypress Rd., Quesnel,  
British Columbia V2J 4B1;  
Darrell Dinsdale, (250) 747-2680



**Dynamic Hobbies,** 21 Concourse Gate,  
Unit 6, Nepean, Ontario,  
K2E7S4; Clark Freeman,  
(613) 225-9634



**East Coast Model Center Raceway,**  
13 Glen Stewart Dr., Ste 1, Southport,  
Prince Edward Island C1A 8X9  
Gary Stephen, (902) 569-3262



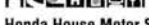
**Fast-Trax Speedway,**  
RR 4, Trenton, Ontario;  
Russ McPeak, (613) 394-6411



**Fly'n Bryan's Radical Raceway  
& Little Shop of Hobbies,** RR #1, Ste.  
12, Comp. 49, Chase, British Columbia,  
Canada V0E 1M0; Bryan Coffey/ Dani  
Potvin, (604) 955-0669



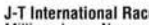
**Gilles Comtois,** 1458, boul. Lafleche,  
Bale-Comeau, Quebec, G5C 1E1;  
(418) 295-1830



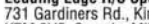
**Hobby 2000,** 75 St.-Jean-Baptiste, Suite  
140, Chateauguay, Quebec, Canada J6J  
3H6; Hogue-Andre Melochie,  
(450) 698-2000



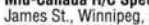
**Honda House Motor Speedway,** 384  
Richmond St., Chatham, Ontario N7M  
1P9; John Elliot, (519) 354-5530



**Interior R/C Raceway,** 34-1605 Summit  
Dr., Kamloops, BC, V2E 2A5; Martin  
Vannieuwenhuizen, (604) 374-1268 or  
(604) 374-8458



**J-T International Raceway,** 127  
Milligan Lane, Nanapanee, Ontario K7R  
8A1; N. O'Neill, (613) 354-0099



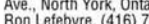
**Leading Edge R/C Speedway,**  
731 Gardiners Rd., Kingston, Ontario  
K7M 3Y5, Canada; Mike and Tony  
Daicar, (613) 389-4878



**Mid-Canada R/C Speedway,** 1678 St.  
James St., Winnipeg, Manitoba R3H  
0L3; Richard Driedger,  
(204) 339-6566



**Miniatures & Passions,**  
204 St. Charles, #103, Ste. Therese,  
Quebec, Canada J7E 2 B4; Gilles  
Lachance, (514) 979-7989



**MORRAC Raceway,** 6449 Crowchild Tr.  
SW., Box 36060, Calgary, Alberta T3E  
7C8; (403) 254-1386



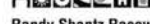
**Off-Road R/C Raceway,** 76 Eddystone  
Ave., North York, Ontario M3N-1H4;  
Ron Lefebvre, (416) 740-0536



**Prince George Radio Controlled  
Car Club,** 202 Explorer Cres.,  
Prince George, B.C. Y2M5R8;  
Doug Waller, (604) 561-0035



**Quintrax Speedway,** 610 Dundas St.  
East, Belleville, Ontario K7K 2M1;  
(613) 962-1414; fax (613) 962-7306



**Randy Shantz Raceway,** 1015 W. 14th  
St., North Vancouver, British Columbia;  
Steve Mulhall, (604) 945-3888



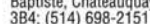
**R/C Champ Raceway,** 670 Progress  
Ave., Rear Unit #13-16; Scarborough,  
Ontario, M1H 3A4; Ben, Matthew or  
Louie (416) 289-8717



**Recreation R/C Raceway,** Hwy 16  
and Ferry Ave., Prince George, BC;  
Doug Waller, (604) 561-0035



**Ronbo's R/C Racing,** RR 1 Glen  
Walter, Cornwall, Ontario K6H 3G4  
Ron Giroux, (613) 936-0176



**Rousillon Hobby Track,** 177-D St-Jean  
Baptiste, Chateauguay, Quebec J6K  
3B4; (514) 698-2151



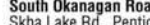
**Shadetree Raceway,** R.R. #4, 22566  
Stage Rd., Thamesville, Ontario;  
Darrin Charbonneau, (519) 692-5211



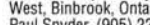
**Snye Wreck RC,** RR#1, St. Regis,  
Que CANADA Homio; Aimee Mitchell,  
(613) 57502496;



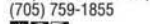
**South Muskoka R.C. Track & Mini  
Putt,** 8903 Hwy 11, Orillia,  
Ontario L3V 6H3;  
Justin Fortin, (705) 329-0397



**Spinnin Wheel Raceway,** RR 1, Ariss,  
Ontario NOB 1B0; (519) 824-1614



**South Okanagan Roadhogs,**  
Skha Lake Rd., Penticton, BC;  
Willie Lemm, (604) 492-5698



**Steeltown Speedway,** 3580 Kirk Road  
West, Binbrook, Ontario L0R 1C0;  
Paul Snyder, (905) 227-7508



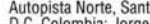
**Strathclair Park,** Old Garden Road  
Rd., Sault Ste. Marie, Ontario P6A 5T1;  
(705) 759-1855



**Sudbury Organized Auto Racing,**  
765 Barrydowne Rd., Sudbury, Ontario  
P3A 3T6; Ken Moore, (705) 524-5339



**Thunder Alley Raceway,** Lambton  
Mall, 1380 London Rd., Sarnia, Ontario  
N7S 1P8; Rob Smith, (519) 882-3361

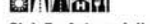


**Vancouver R/C Road Racers,** #100-  
2733 Barney Hwy., Coquitlam, British  
Columbia V3E 1K9; Roger Brown,  
(604) 945-3888



## COLOMBIA

**Club De Automodelismo Colombiano,**  
Centro Recreativo Cafam, Kilometro 14  
Autopista Norte, Santafe De Bogota,  
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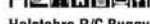
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# Chris's BACK LOT

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o *R/C Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. My email address is: [chrisc@airage.com](mailto:chrisc@airage.com).

BY CHRIS CHIANELLI

## "Hot"?... "Cold"?... "What"?

Dear Chris,  
Every month, I look forward to reading "Piston Power" and "Back Lot" in *Radio Control Car Action*. I have been racing competitively for over 14 years and your straight talk on the hobby is very refreshing.

I run an RC10GT with an O.S. 12CV that usually runs like a Swiss watch. People absolutely marvel at how my well my truck runs. I work in engineering, and I can explain all of the concepts regarding 2-stroke engines. I have even programmed my calculator to calculate air density using temperature, humidity and barometric pressure. I do, however, have one small problem.

This is your mission should you choose to accept it, o Master of the Piston.

I have been unable to find any information about when to use which glow plug. I've heard the standard answers about "use a hot" or "use a cold," but it's beyond me when I should put which plug in my motor. Many of the plug manufacturers don't even furnish any info about which plug is hot or cold—much less what the terms hot, cold, cool, etc., relate to.

Now, here are the details of my current problem: when it's really hot or cold outside, I have no trouble making my GT purr like a kitten; however, when the temperature is right in the middle (specifically 70 degrees, 50-percent humidity, 29.94 inches barometric pressure) I can hardly get my truck to run at all.

I think glow plugs would be an excellent subject for a "Piston Power," especially if you or someone you know can go beyond the standard ambiguous answers. If you can answer the glow-plug dilemma, you'll be my hero.

JODIE

Dear Jodie,  
You're on the right track monitoring things like temperature and humidity; keep up the good work. Before we get into the glow-plug thing, there's one very important item that must be kept in mind at all times concerning glow-powered (alcohol-burning) engines. Unlike gasoline, alcohol—which is what our glow fuel is mostly comprised of (methanol, to be exact)—is hygroscopic. That means it attracts moisture and is dramatically affected by relative humidity changes. Simply put, our glow engines will run hotter on high-humidity days than on low-humidity days. Relative humidity, percentage of nitro in the fuel and compression ratio of the engine are a few very important factors that relate to the choice of "hot" or "cold" plugs. Ambient (surrounding) temperature does have an effect; however, you can easily compensate for hot weather by using a slightly richer, cooling mixture. Hot, dry days are much easier to deal with than hot, humid ones.

There is so much bogus plug information bouncing around, the first thing you need to do is to get a feel for whom to ignore. If you're told something ridiculous like, "Yeah, man, 'hot' plugs are good for around Christmastime and 'cold' plugs are good for around the 4th of July," politely thank the person and tune him out forevermore. Why do people find it so hard to say, "Gee, I just don't know"? While it is true that a hot plug might get you started a little faster in cold weather, a good, well-charged starter battery will do the same thing no matter which plug is used.

The plug question involves so many factors, I really should do an entire "Piston Power" on the subject. Not to mention that there is no standardization among manufacturers: one manufacturer's "hot" may equal another's "medium."

Basically, without getting into alloys such as platinum, the "hot" versus "cold" thing starts with this: thicker elements are tougher but dissipate heat faster so they are labeled "cold"; thinner elements glow hotter and retain heat

longer so they are labeled "hot." Thinner elements, however, are more delicate and herein lies the problem: a "colder" plug is often called for with high-nitro, high-rpm conditions simply because its thicker element will hold up under these racing conditions. Use a "hot" plug while running 30-percent-nitro fuel on a hot and humid day, and the hotter plug's more delicate element may not last one heat. There are many times when a "hotter" plug would be most desirable, but it just will not hold up under certain conditions. Generally, a hotter plug gives better idle and better low-end throttle response. But another problem can occur with

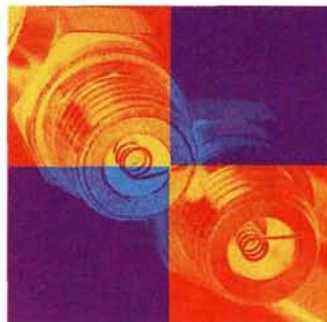
this "hotter is better" notion. Independently, either high nitro or a "hot" plug will advance ignition timing, and that will improve performance. Used together, they can sometimes advance timing too much and drive the engine into pre-ignition. This is bad. If your engine ever makes a "frying egg" sound, that's pre-ignition. To fix it, you can lower the nitro, lower the compression ratio by adding an extra head shim, or simply go to a colder "plug."

With a proper, slightly rich fuel mix as the all-important given, I try to run as hot a plug as conditions (such as nitro percentage, humidity and compression) will allow. Sometimes, conditions won't allow anything but a "colder," more durable plug. In your case, Jodie, I would try either an O.S. no. 8 (more recent CVs come with an O.S. A3 plug) or a McCoy MC-59. The latter is also much less expensive.

Jodie, you didn't tell me which fuel or glow plug you were using. You guys have got to give me all the info if you expect me to help!

I don't understand why your engine runs well in hot weather when the air is less dense (less oxygen), but you can't get it to run in 70 degrees and 50 percent relative humidity (very favorable conditions). Is there something you're not telling me? Something like, "Well, I did run the engine way too lean a dozen times or so." It's OK; you can tell me. I've made all the mistakes at least two dozen times myself!

—Chris



**Relative humidity, percentage of nitro in the fuel and compression ratio of the engine are a few very important factors that relate to the choice of "hot" or "cold" plugs.**





# ADVERTISER INDEX

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 Ace Hobby Dist., 49  
 Airtronics, 39  
 America's Hobby Ctr., 165-167  
 Associated Electrics, 41, 59, 81, 119, 139, 179  
 B&B Software, 202  
 Bruckner Hobbies, 156-157  
 Boca Bearing Co., 189  
 Bolink R/C Cars, 178  
 BSR Enterprises, 117  
 California R/C Ctr., 140-143  
 Cermark Model Supply Co., 216  
 Cirrus, 101  
 Competition Electronics, 99  
 Dalton Raceway, 189  
 Deans Connectors, 116  
 DuraTrax, 33, 35  
 Endless Summer Classic, 206  
 ERI Associates, 189  
 ESP Mfg., 202  
 FMA Direct, 160  
 Futaba Corp. of America, 150  
 G.T.P. California, 161  
 General Silicones, 113  
 Genka Trading Corp., 44-45  
 GM Racing USA, 102-103  
 Golden Horizons, 57  
 Hammad Ghuman, 50-51  
 Hitec/RCD, 29, 92  
 Hobby Products Intl., 30-31, 84-85  
 Hobby Shack, 174-177  
 Hobby Tech, 159  
 Hobby World, 205  
 Hobbytown USA, 100, 118  
 Horizon Hobby Dist., 19  
 Hudy Special Products, 83  
 Integy Inc., 158  
 Kawada USA, 93  
 Keyence Corp., 53  
 Kondo Kagaku Co. Ltd., 89

Kyosho, 14-17, 147, 183  
 Lite Machines Corp., 204  
 LRP Electronics, 130, 179  
 Lucas Racing, 115  
 M.D. Planes, 164  
 M.I.P., 132  
 Mach 1 Hobbies, 202  
 Model Rectifier Corp., 9  
 Mugen Seiki Racing Ltd., 180  
 Novak Electronics, 11  
 O.S. Engines, 91  
 OFNA Racing, 20-21, 42-43, 76-77, 104-105, 181  
 Omni Models, 192-194  
 ORA Atomic Racers, 195  
 Parma Intl., 67  
 Peak Performance, 69  
 Penguin R/C, 204  
 Plein Air, 189  
 Precision Model Dist., 98  
 Progressive Suspension, 100  
 Pro-Line, 6-7, 214, 218-C3  
 R&D Racing, 202  
 R/C Car Kings, 172  
 R/C Touring Cars, 203  
 Reedy Modifieds, 81  
 Ripon R/C Speedway, 186  
 Robinson Racing, 46-47  
 RPM, 187  
 S.E.I. Racing, 152  
 Savon Hobbies, 196-199  
 Schumacher, 195  
 Serpent USA, 148-149  
 Stormer Hobbies, 168-171  
 Tamiya America, C2, 36-37, 173  
 Team Losi, 55, 191  
 Team Orion, 75, 137, 204  
 Tekin Electronics, 94  
 Tower Hobbies, 124-129  
 Trinity, 3, 4-5, 12-13, 24, 26-27, C4  
 Traxxas Corp., 95  
 Ultimate Hobbies, 185  
 XS Speed, 202  
 Yokomo USA, 22-23

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# INDEX OF MANUFACTURERS

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